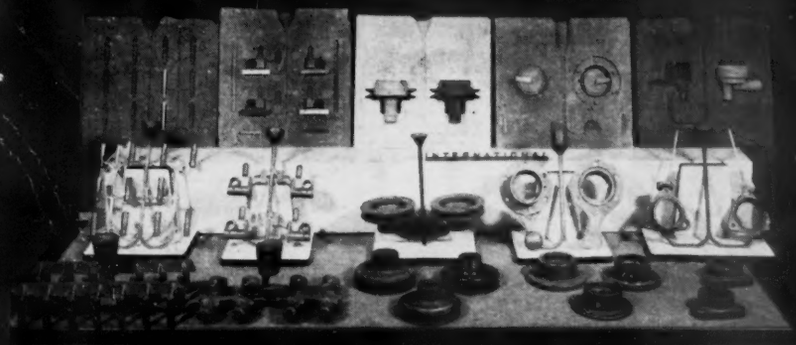
NOVEMBER 1952

FOUNDRY

FOUNDRY SAFETY

MECHANIZING THE SMALL SHOP

WHY HOT TEARING?



SHELL MOLDING—TWO YEARS OF RESEARCH

CONTENTS—PAGE 3

MORE FINISHED CASTINGS PER TON OF METAL POURED

with

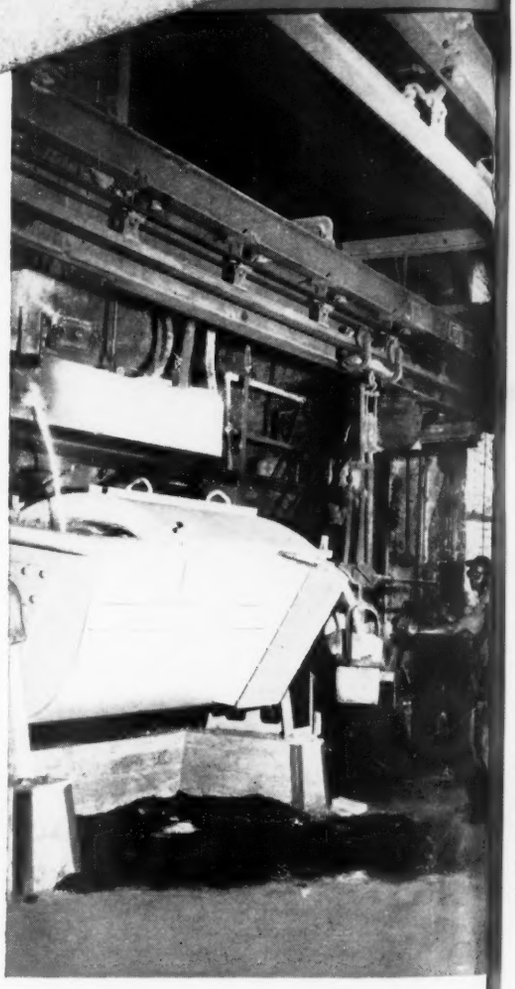
PURITE—100% Fused Soda Ash. The Scientific Flux for Better Melting and Cleaner Iron

PURITE—is sold by all leading foundry supply houses in the United States and Canada

Like so many modern foundries, the Stockham installation relies on Purite to help produce the quality iron needed for their valves and fittings. For cleaner, sounder iron castings...for ladle desulphurizing and as a cupola flux...Purite has proved its efficiency and economy by its industry-wide acceptance for nearly 30 years.
These exclusive advantages show why –

1. Purite produces a higher percentage of finished castings per ton of metal poured.
2. Purite gives 100% fluxing action in the cupola — 100% desulphurizing action in the ladle.
3. Purite gets to all the iron quicker.
4. Purite is time-tested and proven for unsurpassed desulphurizing uniformity.
5. Purite comes in 2-lb. pigs and 2-oz. tablets — no weighing or measuring required.
6. Purite is 100% pure fused soda ash — you do not pay for inert materials.
7. Purite does not crumble — no waste — no dust.
8. Purite can be shipped in bulk carloads at substantial savings over bag shipments — is easily stored without deterioration.

Purite can help you cut casting losses. Write for the booklet, "Refining and Desulphurizing Cupola Iron"; it illustrates in detail the accepted ways in which Purite is most effective. Mathieson Chemical Corporation, Baltimore 3, Maryland.



Stockham Valves and Fittings uses Purite in this 10,00 lb. mixing and desulphurizing ladle in their grey iro foundry. The cast iron pipe fittings and iron valve par made from this iron meet the requirements of AST A-126, Class B.

Mathieson
CHEMICALS

SERVING INDUSTRY, AGRICULTURE AND PUBLIC HEALTH

NICKEL ALLOY IRONS
develop improved properties
plus all the basic advantages of plain cast iron

PLAIN GRAY IRON is, structurally, a steel matrix containing graphite flakes. Engineering, physical, processing and service properties are wholly dependent upon the character and disposition of these flakes, and upon the nature of the matrix.

The matrix of nickel alloyed irons closely resembles the pearlitic matrix found in high carbon steels, whereas the matrix of ordinary plain iron resembles that found in low carbon steels. Compositions of nickel alloy irons can be adjusted to reduce "chill" in thin sections without risk of forming "spongy" regions in heavy sections. This promotes uniform strength, improved machinability, pressure tightness and wear resistance.

Hardness in nickel cast irons results from improvement of the matrix. Chilled areas and hard carbides, which impair machinability, are obviated. Nickel improves response to heat treating. In fact, use of nickel alone or with other alloying elements plays an important part in meeting a variety of requirements.

Accordingly . . . nickel alloyed irons permit production of castings with high levels of the following properties:

Strength

Tensile and transverse strengths of castings are greatly increased by the addition of nickel to cast irons of properly adjusted base mixture. The ratio of compressive strength to tensile strength is retained. Greater uniformity of strength in thick and thin sections is achieved.

Elasticity

The elastic modulus increases with strength. In this respect nickel-containing irons of the high strength type possess good stiffness and do not deform permanently under loads that would be damaging to irons of lower elastic modulus.

Damping Capacity

The damping capacity inherent in gray cast iron is not impaired by the presence of nickel.

Wear Resistance

The uniformly pearlitic matrix of nickel cast irons appreciably improves wear resistance. The uniformly fine graphite flake distribution, achieved in suitably processed irons *without formation of a poor wearing dendritic condition*, affords optimum resistance to wear and galling.

Pressure Tightness

Characterized by dense grain structure and fine dispersion of graphite throughout, nickel alloy irons are close-grained and offer an extraordinary degree of pressure tightness under high hydrostatic pressures, without sacrificing machinability.

Applications

Heavy machinery frames and *beds* are typical of cast parts that benefit from the rigidity and good damping capacity of nickel cast irons. *Cylinder* and *pump liners, gears, dies, machine tool ways, saddles* and *tables* exemplify parts produced in nickel irons to assure greatly increased strength and wear resistance. And nickel alloyed iron is used for *heavy duty brake drums* to resist heat checking, thermal shock, wear and galling. The nickel cast irons are readily heat treated, and respond particularly well to flame and induction hardening.

At the present time, the bulk of the nickel produced is being diverted to defense. Through application to the appropriate authorities, nickel is obtainable for the production of engineering nickel cast irons for many end uses in defense and defense supporting industries.

The International Nickel Company, Inc.
Dept. F, 67 Wall St., New York 5, N. Y.

Please send me booklet entitled, "Guide to the Selection of Engineering Cast Irons."

Name _____ *Title* _____

Company _____

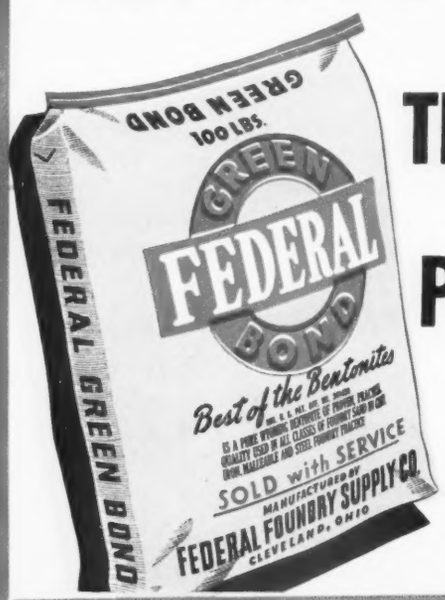
Address _____

City _____ *State* _____

EMBLEM OF INCO SERVICE
TRADE MARK

THE INTERNATIONAL NICKEL COMPANY, INC. 67 WALL STREET NEW YORK 5, N. Y.

MANY TIMES



THE NATURAL BONDING POWER OF ANY OTHER TYPE OF SAND BOND

Used primarily as an admix to molding and core sands, GREEN BOND is unexcelled in its ability to develop and control green bond strength. Tests show that it has from six to ten times the bond strength of the clays found in most natural molding sands. It produces high green and dry strength in sharp sands even when comprising but ½% to ¾% of the entire mixture, yet molds disintegrate readily at the shakeout. GREEN BOND coats the individual grains of sand as completely as core oils coat core sands, therefore does not clog the voids. Bond is thus established at the points of contact of the grains and the sand is left properly porous and permeable.

There are many other advantages connected with the use of GREEN BOND which, of course, you'll never obtain unless you try it.

FEDERAL

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FEDERAL

NOVEMBER 1952

FOUNDRY

Volume 80—Number 11

NBP CCA

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Managing Editor

EDWIN BREMER
Metallurgical Editor

PAT DWYER
Engineering Editor

ROBERT H. HERRMANN
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VIRGINIA C. TAYLOR
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DON S. CADOT
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London.....VINCENT DELPORT

Advisory Staff

JOHN W. BOLTON, JOHN HOWE HALL, ALBERT E. GROVER, HARRY A. SCHWARTZ, BERNARD P. MULCAHY

Main Office

Penton Building, Cleveland 13, Ohio
MAin 1-8260

Branch Offices

New York, 17 ..... 60 East 42nd St. Murray Hill 2-2581
Chicago, 11 ..... 520 N. Michigan Ave. Whitehall 4-1234
Detroit, 2 ..... 6560 Cass Ave. Trinity 5-3024
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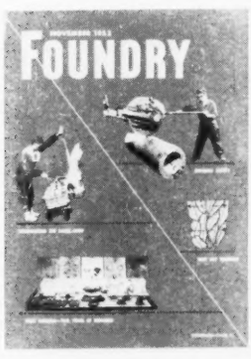
Business Staff—Page 322



THE COVER: Mechanization, safety, shell molding, and hot tearing are among subjects treated in this issue

SPECIAL ARTICLES

Editorial 101

Shell Molding at International Harvester Co. 102
By GARNET P. PHILLIPS

Effect of Oxidation Rates on Graphitization 108
By MILTON TILLEY

Manual Handling Minimized in Sixth-Floor Brass Foundry 110

The Role of Castings in the Agricultural Industry 114
By WILLIAM G. GUDE

How To Inventory Vocational Assets and Liabilities 118
By R. L. BRADLEY

Making the Foundry Safe for Top Production 120
By STANLEY C. HERBINE

Strain Theory of Hot Tearing 124
By WILLIAM S. PELLINI

National Foundry Association Meets 153
By FRANK G. STEINEBACH

Steel Founders' Society Annual Fall Meeting 175
By FRANK G. STEINEBACH

Man-to-Man on the Molder's Bench 206
By RALPH L. LEE

Ohio Regional Foundry Conference 210

Proper Ventilation Improves Foundry Working Conditions 218

Air-Weight Control Increases Cupola Efficiency 275
By PAUL GLASS

Portable X-ray Unit Has 250,000-volt Capacity 280

NEWS FEATURES

Around the Country 158
Calendar of Meetings 220
Foundry Group Activities 180
Industry Briefs 246
Late Foundry News 33
Men of Industry 140
News Views 164
Obituary 202
Statistics 149

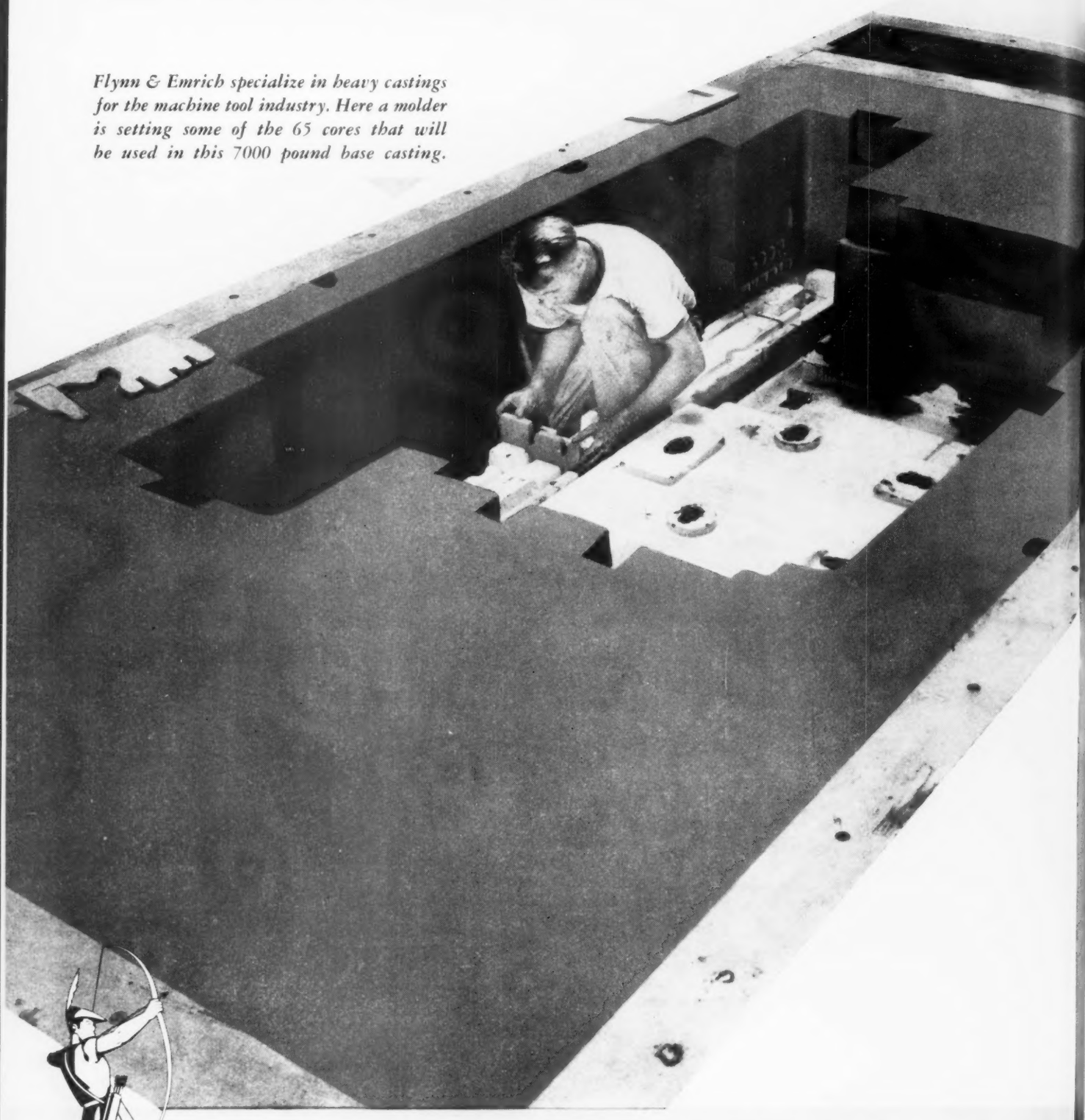
DEPARTMENTS

ABC of Foundry Practice 241
Adventures of Bill By PAT DWYER 248
Advertisers' Index 322
Cupola Operation By BERNARD P. MULCAHY 236
Data Sheet 169
Foundry Developments 162
How To Do It 216
Ideas for Foundrymen 259
New Equipment and Supplies 256
Questions and Answers 134
Trade Publications 294
With the Editors 10

UNIFORM

LINOIL HELPS SET

Flynn & Emrich specialize in heavy castings for the machine tool industry. Here a molder is setting some of the 65 cores that will be used in this 7000 pound base casting.



ARCHER • DANIELS • MIDLAND COMPANY

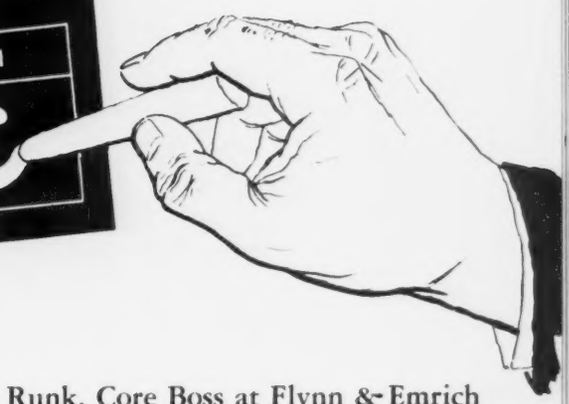
FOUNDRY PRODUCTS DIVISION • 2191 WEST 110TH STREET • CLEVELAND 2, OHIO

NO-SCRAP RECORD!

FLYNN & EMRICH CO.

SCRAP FROM CORE FAILURES

1947	1948	1949	1950	1951
0	0	0	0	0



Charlie Runk, Core Boss at Flynn & Emrich Company's foundry in Baltimore, is justly proud of the record of his core room. Weekly scrap report sheets show *no casting losses charged to the core room during the past five years.*

F & E's core room is a carefully operated department. There's no guess-work. Dry ingredients are weighed before being added to the muller. A plant-designed-and-built metering system delivers exact amounts of water and LINOIL. Oven temperatures are watched closely. Constant supervision on every operation eliminates any chance errors.

The reason Flynn & Emrich use LINOIL is simple. They consider LINOIL one of their constant factors in a varied jobbing production. They know that cores will be strong and thoroughly baked. They feel they can count on good cores today, tomorrow, and every day . . . and they can. Look at the record.

If you're not presently a LINOIL user, ask your LINOIL man for a demonstration next time he calls.

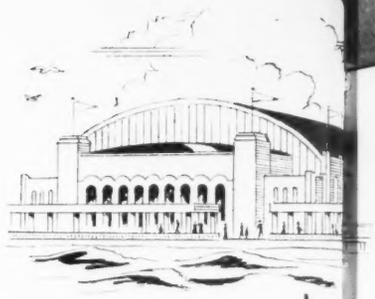
Cores of all sizes and shapes are baked together. LINOIL insures a thorough bake in the largest cores —no overbaking in the smallest.

FREE BOOKLET

A new booklet, "Facts about the LINOIL 700 Series" is available on request.

Doubles Cleaning Output per man-hour*

with PANGBORN Blastmaster ROTOBLAST® Barrel



*at Riverside Foundry Co., Wrightsville, Pennsylvania

The same Pangborn Blastmaster ROTOBLAST Barrel that was the sensation of the 1952 Foundry Show is an even greater sensation on the job! Delivered directly from the floor of Convention Hall to the Riverside Foundry Co., Wrightsville, Pa., the Barrel has already more than doubled the cleaning output per man-hour at this jobbing foundry! And Riverside officials are sold on the high quality of cleaning, the wide range of sizes of castings that can be cleaned, and the absolute abrasive-tightness of the machine.

No matter what you clean—large or small castings, fragile or intricate castings, or any combination—there's a modern ROTOBLAST unit to do a better job for you at far lower cost. Write for details. Ask for Bulletin No. 223 (Blastmaster Barrel) or No. 214 (all ROTOBLAST equipment). Address: PANGBORN CORPORATION, 1400 Pangborn Blvd., Hagerstown, Maryland.

Wide range of sizes and shapes of castings cleaned by the Blastmaster Barrel at Riverside Foundry.

OVER 28,000 PANGBORN MACHINES SERVING INDUSTRY

Look to Pangborn for the latest developments in Blast Cleaning and Dust Control equipment

FOUNDRY EQUIPMENT MANUFACTURERS ASSOCIATION INC. MEMBER FEMA

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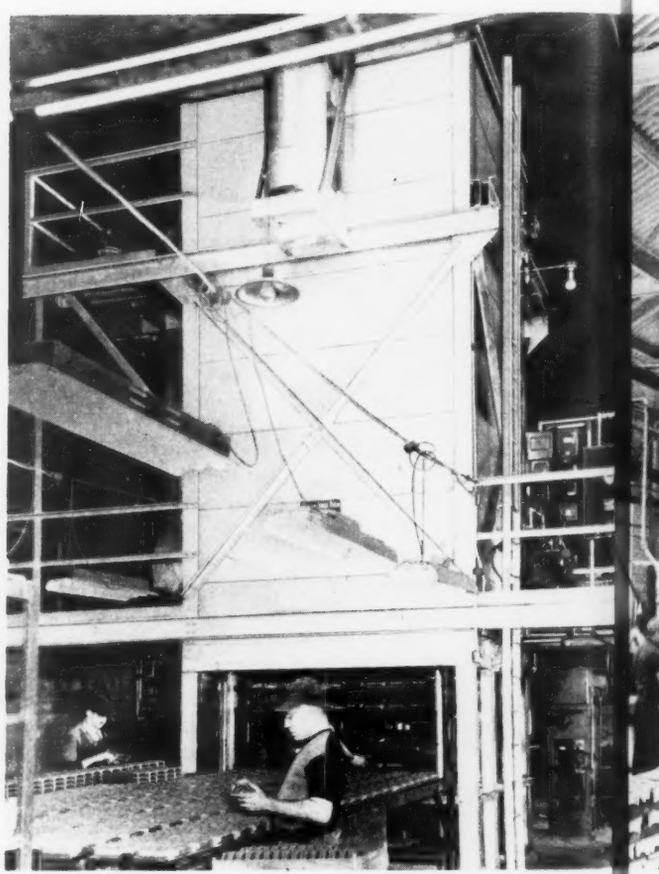
NEW!
12 CU. FT. CAPACITY
ROTOBLAST BARREL
Pangborn
Pangborn
NEW!
Pangborn
SEPARA
NEW! Pangborn NEW!
NEW!
HIS NEW PANGBORN
OTOBLAST BARREL
OR BATCH TYPE
LEANING IS
RASIVE TIGHT
From Foundry Show at Atlantic City to Riverside Foundry Company's work floor—that's the story of this Pangborn Blastmaster ROTOBLAST Barrel. Note the signs painted on the machine for the Show are still visible.
How ROTOBLAST works for you:
SAVES LABOR with push-button operation
SAVES SPACE because machines are compact
SAVES TIME by cleaning more loads per day
SAVES POWER since no compressor is needed
SAVES TOOLS because all scale is removed
BLAST CLEANS
CHEAPER
with the right equipment
for every job

lowest cost core

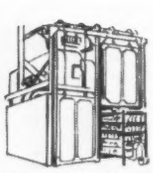
COLEMAN *Tower*

Coleman Tower Oven at Monroe Steel Castings Company

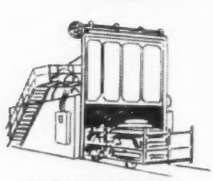


Coleman Tower Oven at Barnes Manufacturing Company

A COMPLETE RANGE OF TYPES: COLEMAN OVENS are built in a complete range of sizes and capacities for every core-baking and mold drying requirement.

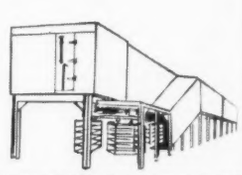


TRANSRACK OVENS



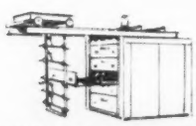
CAR-TYPE OVENS

CONTINUOUS REDRY OVENS

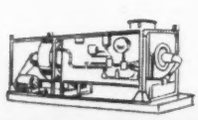


HORIZONTAL CONVEYOR OVENS

PORTABLE OVENS



ROLLING DRAWER OVENS

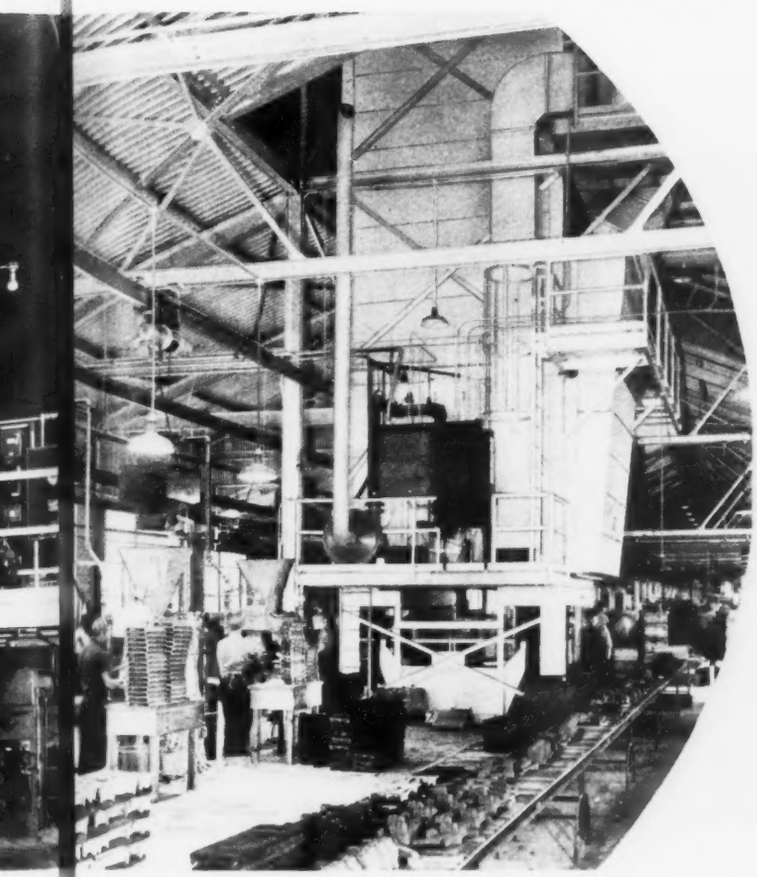


PORTABLE MOLD DRYERS

CONTINUOUS MOLD OVENS

r baking method...

r OVENS



npany *man Tower Oven at National Sewing Machine Company*

No other method compares with Coleman Tower Ovens for core-baking efficiency. Only Coleman Tower Ovens have the exclusive features which enable cores of widely different sizes and shapes to be handled at the same time, all baked with consistent uniformity!

Coleman Tower Ovens have the patented open center which increases oven loading accessibility and improves productivity of coremakers. By eliminating trucks, racks and multiple handling operations, Coleman Tower Ovens provide savings up to 75%.

Hundreds of foundries from coast-to-coast have proved that Coleman Tower Ovens have regularly outperformed any other method of high quality core baking. Our engineers are available without obligation to show you how you can obtain greater core output from less space at remarkable savings...call or write.

Only* COLEMAN TOWER OVENS *offer all these advantages:

EFFICIENT HANDLING METHODS eliminate delays and losses.

PERFECT CORE BAKING ends manpower and casting losses due to make-overs and rejects.

INCREASED PRODUCTION by making the most efficient use of skilled and unskilled labor.

SUPERIOR WORKING CONDITIONS...cores are cooled and smoked-off before leaving oven.

HEAVY DUTY CONSTRUCTION for continuous dependable performance and economical operation.

GREATEST SAVINGS IN FUEL by using the most economical fuel available.

SAVE BINDER. Proper core baking atmosphere and uniform temperature permit important savings in conventional binders.

USE HIGH SPEED CORE BINDERS. Coleman Ovens have uniform temperature and accurate control to handle temperature-sensitive resins and pre-baked oils.

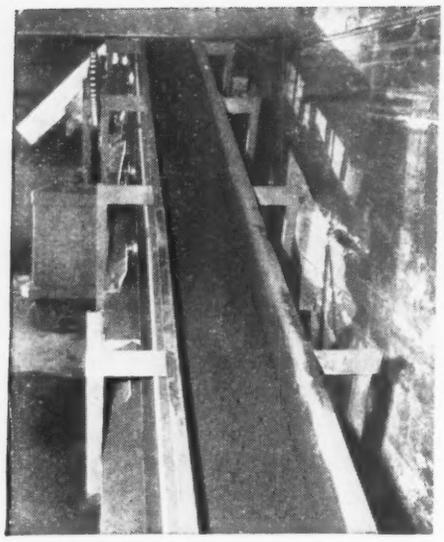
Write for Bulletin 48

THE FOUNDRY EQUIPMENT COMPANY

1831 COLUMBUS ROAD

CLEVELAND 13, OHIO

WORLD'S OLDEST AND LARGEST FOUNDRY OVEN SPECIALISTS



6 REASONS WHY

Studebaker standardized on Imperial Belting

FOR ALL HOT APPLICATIONS

1. Job-designed to meet specific operating conditions.
2. Made of finest heavy-duty hard silver duck.
3. Tensile strength of duck well over 750 lb. per inch of width.
4. Inner-locked double stitching permanently prevents ply separation.
5. Special impregnation plus asbestos and an insulating member give high heat resistance.
6. Densely woven to resist "come-and-go."

Studebaker has standarized on Imperial Belting. In the installation pictured above, Imperial Insulated Sahara moves very hot sand up an 18° incline conveyor. Two years in operation, the belt is just a youngster with a long, useful service life ahead.

Write for Data Sheet 47-8 and prices.
(No salesman calls unless requested)

IMPERIAL BELTING COMPANY
1755 South Kilbourn Ave., Chicago 23, Ill.

Imperial
INNER-LOCKED
BELTING
Engineered Belting—
The Right Belt for Each Job

With the EDITORS

CONVENTIONITIS: The Editor of *Penton Progress,* a weekly news report that reaches all Penton Publishing Co. employees every Monday morning, recently had a news story headed "Conventionitis Hits Penton." The story went on to tell that this is the time of year when the frequency of important conventions and meetings puts a terrific strain on the people in many Penton departments. This seems to be an apt description of the situation in the foundry industry and the problems of the editors of FOUNDRY.

From early September until mid-October, FOUNDRY editors have attended the National Tractor Meeting of the Society of Automotive Engineers in Milwaukee, the annual meeting of the National Foundry Association in Chicago, the fall meeting of the Steel Founders' Society of America at Hot Springs, Va., both the annual fall industry meeting of the Malleable Founders' Society and the Supervisory Development Conference of that society in Cleveland, the Ohio Regional Foundry Conference at Columbus, and a meeting of the Society of Business Magazine Editors at Washington. In addition, editors were present at the technical press demonstration of ductile iron production at the Bayonne, N. J. laboratory of the International Nickel Co., and the open house of the new Whitehall Precision Castings Division of the Michigan Steel Casting Co., at Whitehall, Mich.

But the end is not in sight, and the last two weeks of October and the month of November will be just as strenuous.

—o—

Congratulations: Like FOUNDRY, the Belle City Malleable Iron Co., Racine, Wis., is marking its 60th anniversary. In a recent anniversary issue of the company's publication, *Foundryways,* we particularly liked this message of C. S. Anderson, president:

"In the span of a man's life, sixty years represents the greater portion of his expectancy, but in a company's life it only signals the beginning. A good company lives beyond the men and women who work for its success.

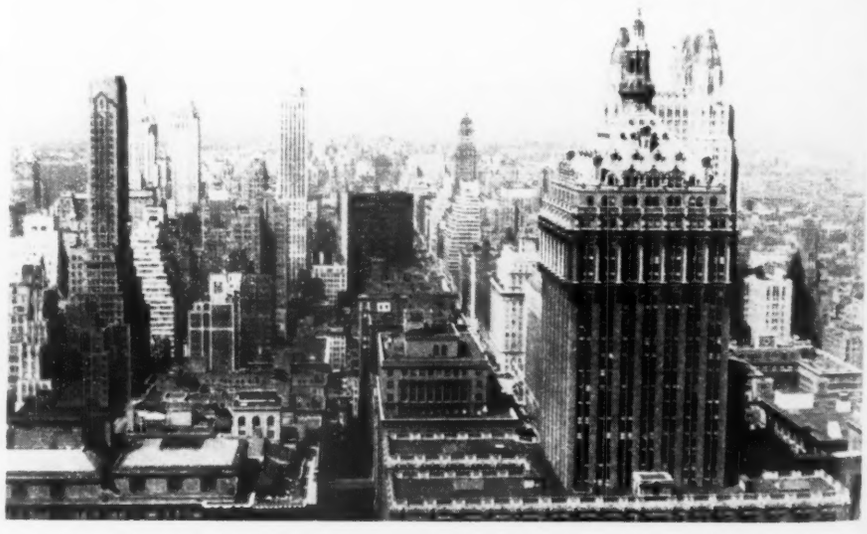
"However, just as a son remembers the philosophy of his father, Belle City will inherit forever the contributions made by all who have worked within its walls. It is to these employees, whether they be molders or chairman of the board of directors, we dedicate this booklet recognizing our 60th anniversary of service to customers, employees, stockholders and community."

Congratulations to Belle City.

—o—

An Editor's View: Ever wonder what an editor sees as he gazes out of the window while awaiting an inspiration for a story? We asked Ben Price, New York editor, that question, and he sent along an excellent

(Concluded on page 12)



Uptown New York skyline as seen from Editor Ben Price's office window

CRUCIBLE melting

Crucible Melting enables foundrymen to meet any metallurgical specification.

Other types of melting equipment have been devised in attempts to offer improvement in speed, or economy or some other single advantage.

But only furnaces using Crucibles have been able to keep pace with both production and metallurgy in speed, economy and quality.

leads in FLEXIBILITY

Crucible Melters' Handbook sent free; gives information on the care and use of Crucibles.

CRUCIBLE MANUFACTURERS ASSOCIATION

27 WILLIAM STREET, NEW YORK 5, N. Y.

CRUCIBLES FOR FLEXIBILITY

THESE FIRMS CAN TAKE CARE OF ALL YOUR REQUIREMENTS FOR CRUCIBLE MELTING

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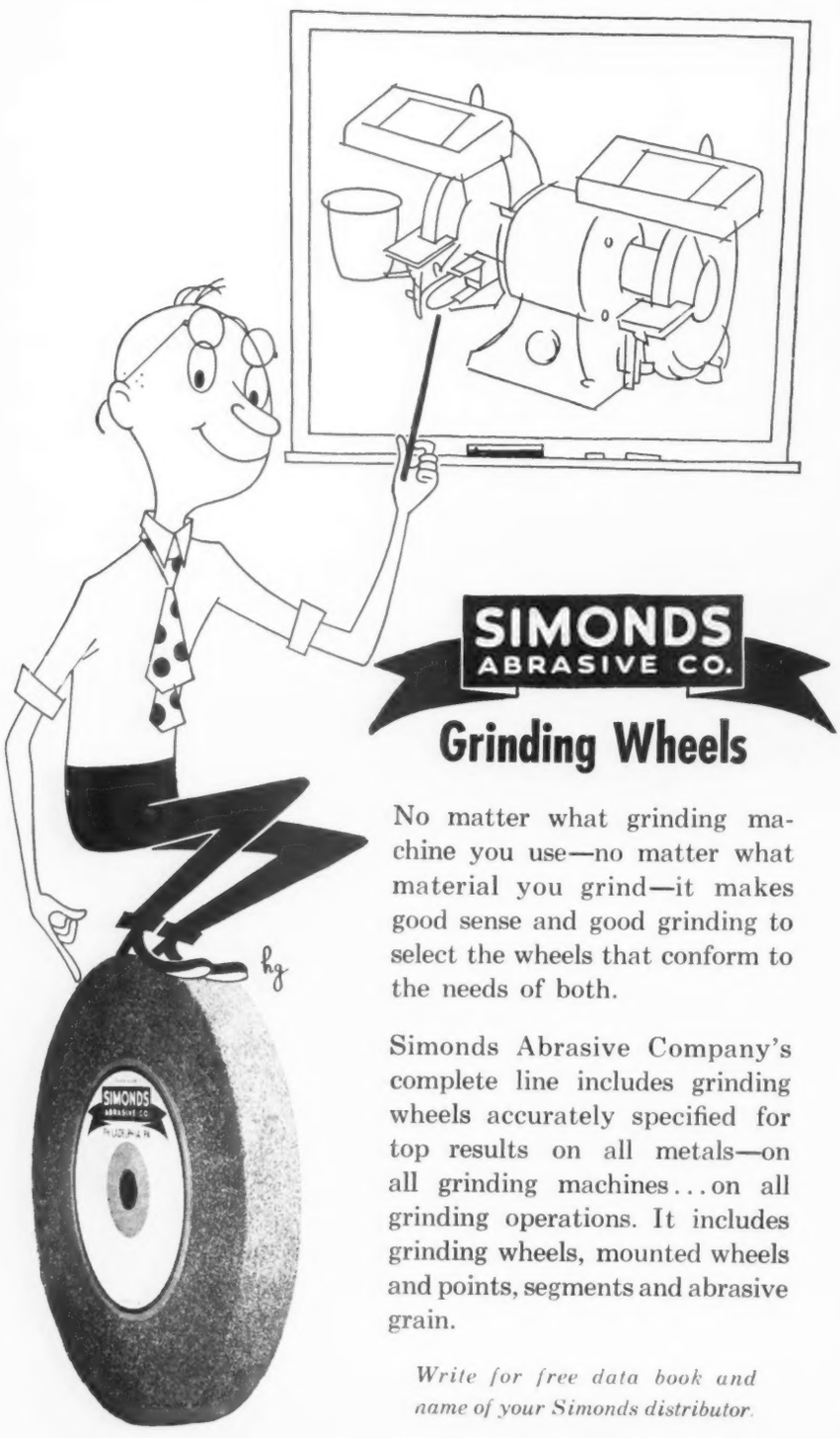
AMERICAN REFRACTORIES & CRUCIBLE CORP.
ELECTRO REFRACTORIES & ABRASIVES CORP.
JOSEPH DIXON CRUCIBLE CO.
ROSS-TACONY CRUCIBLE CO.
LAVA CRUCIBLE-REFRACTORIES CO.

The right start for GOOD GRINDING!



Grinding Wheels

No matter what grinding machine you use—no matter what material you grind—it makes good sense and good grinding to select the wheels that conform to the needs of both.

Simonds Abrasive Company's complete line includes grinding wheels accurately specified for top results on all metals—on all grinding machines . . . on all grinding operations. It includes grinding wheels, mounted wheels and points, segments and abrasive grain.

Write for free data book and name of your Simonds distributor.

SIMONDS ABRASIVE CO., PHILADELPHIA 37, PA. BRANCH WAREHOUSES: CHICAGO, DETROIT, BOSTON
DISTRIBUTORS IN PRINCIPAL CITIES

Division of Simonds Saw and Steel Co., Fitchburg, Mass. Other Simonds Companies: Simonds Steel Mills, Lockport, N. Y., Simonds Canada Saw Co., Ltd., Montreal, Que. and Simonds Canada Abrasive Co., Ltd., Arvida, Que.

(*Concluded from page* 10)

photograph taken from his office on the 41st floor of the Lincoln Building, 60 East 42nd St., New York. On a clear day it is possible to see much farther than the camera can record, and it surely is an inspiring sight.

—o—

At Home or Abroad: Ever since Ralph Lee started to talk in our family journal about his hobby foundry, foundrymen have been beating a path to Birmingham, Mich., (15 miles north of Detroit) to see this operation. Now the hometown paper, the *Birmingham Eccentric*, has presented quite a human interest story on this famous citizen and his hobby foundry.

The story points out that Ralph has developed a new air-pack molding machine, and we would like to report that this invention will be described shortly in FOUNDRY. We are indebted to the *Birmingham Eccentric* for the photograph of Ralph at his machine, reproduced above.

—o—

Red Face: Although we are continually checking and rechecking the editorial material to avoid mistakes, they do happen. But the September issue rang the bell, for we made two miscues in connection with a single foundry organization. So we would like to tell you that Karl S. Howard, co-author of the article, "Sand Reclamation at the Eddystone Plant," is vice president of General Steel Castings Corp., and that Thomas R. Eggert has joined the General Steel Castings Corp., at Granite City, not the Granite Steel Castings Corp. Yes, our face is red. And while talking about errors, we might point out that this department, in the October issue, reported on a visit to the Midwest Foundry Co. at Coldwater, Mich., and mentioned a "plaster" pattern in connection with the investment mold process. Even an editor should know this is a "plastic" pattern.

F.G.S.

How to handle the "HOT ONES" and get longer conveyor belt life

NEW SAND
TEMPERED SAND
RETURN SAND
OILY CORE SAND
CASTINGS
SCRAP METAL
BAKED CORES
FLASKS

YOU know how most foundries are "belt eaters" when it comes to conveyor belting. Temperatures handled vary from cold to red hot materials; belts may be damaged by sharp metal. As a result, belt life in foundries can be measured in anything from days to years.

Meeting the specific on-the-job requirements for each conveyor in your plant calls for the G.T.M.—Goodyear Technical Man. For he knows conveyor belts best—and can specify a belt for each installation that matches its specific requirements to give you longest, most trouble-free service at lowest over-all cost. You can reach the G.T.M. for a discussion of your specific problems by writing Goodyear, Mechanical Goods Division, Akron 16, Ohio.

GOODYEAR INDUSTRIAL RUBBER PRODUCTS
GTM-Specified CONVEYOR BELT
CONSTRUCTIONS for USE IN FOUNDRIES

STYLE HT — moderate temperatures — 150°-250° — and average abrasion

STYLE 6740 — temperatures over 250°

GLASS FABRIC CONVEYOR — temperatures over 300°

STYLE B STACKER — where abrasion is greater problem than heat resistance

WIRE INSERTED BELTS — where accidental ripping is problem

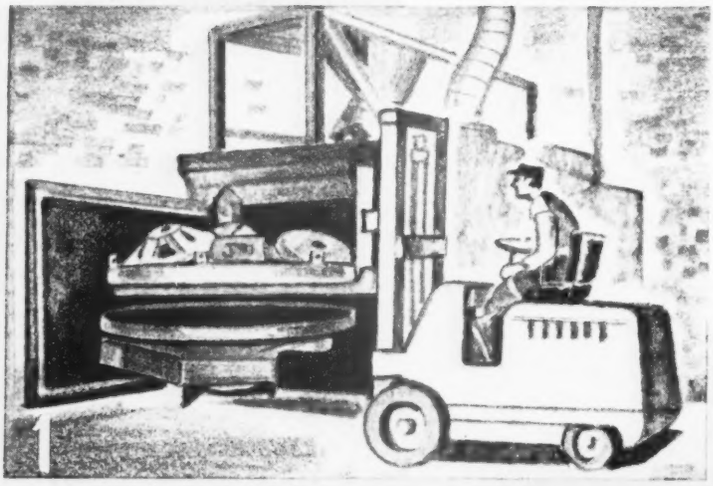
YOUR GOODYEAR DISTRIBUTOR *can quickly supply you with Hose, Flat Belts, V-Belts, Molded Goods, Packing, Tank Lining, Rubber-Covered Rolls. He's listed in the yellow pages of your telephone directory under "Rubber Products" or "Rubber Goods." Or write Goodyear, Mechanical Goods Division, Akron 16, Ohio.*

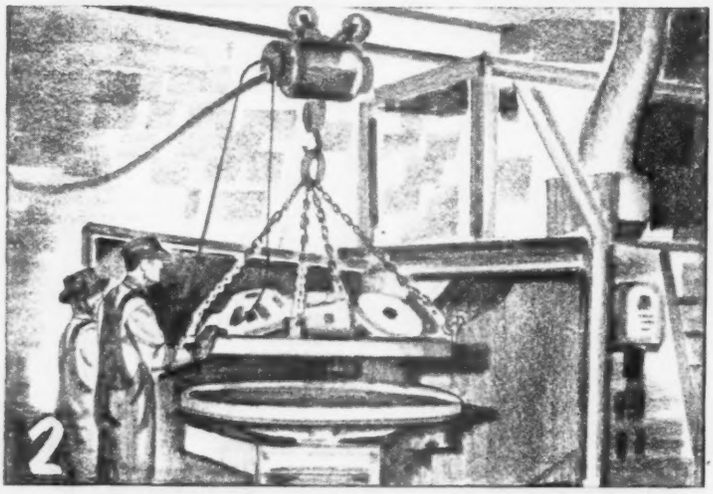
GOODYEAR

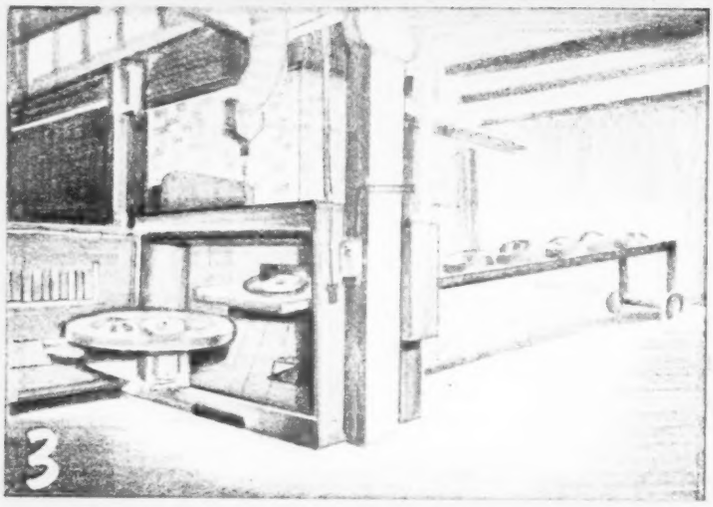
THE GREATEST NAME IN RUBBER

NOW clean a greater variety o

WHEELABRATORS







There are three prime reasons why Wheelabrator Swing Tables cut cleaning costs: (1) a greater variety of sizes and shapes of parts can be cleaned in the Swing Table; (2) Work loads are cleaned in minutes that take hours by other methods; (3) *Downtime for loading and unloading is but a fraction of that required for other table and table room machines.*

Swing Tables handle a greater variety of parts and take less time to load because of their unique design wherein the work table is mounted on the door of the machine. With the door open, the work table is fully exposed for loading by any

spend less time loading
more time cleaning

These work-handling methods cut costs:

1 *Lift Truck and Auxiliary Table*—With the door of the Swing Table open, the work table is fully exposed so that preloaded auxiliary tables can be quickly set in place by lift truck.

2 *Jib Crane and Auxiliary Table*—The full, unrestricted area above the work table makes it possible to place and remove pre-loaded auxiliary tables with a jib crane easily and without difficult maneuvering.

3 *Conveyor and Vestibule*—Swing Tables can be equipped with a vestibule and a roller conveyor for cleaning extra long pieces. One foundry is regularly cleaning work 16 ft. long in this manner as well as their production of smaller castings.

SEND TODAY FOR
CATALOG NO. 214A

THE AMERICAN WHEELABRATOR

ety of castings in less time

RSwing Table

number of work handling methods. Auxiliary tables, loaded while the machine is in operation, can be quickly set in place to cut downtime to a minimum. Loads are cleaned in minutes by the controlled blast thrown by centrifugal force. This blast scours away every trace of sand and scale right down to the virgin metal.

No other single blast cleaning machine provides the versatility and time-saving work handling convenience of the Swing Table. For proof, see the case histories below.

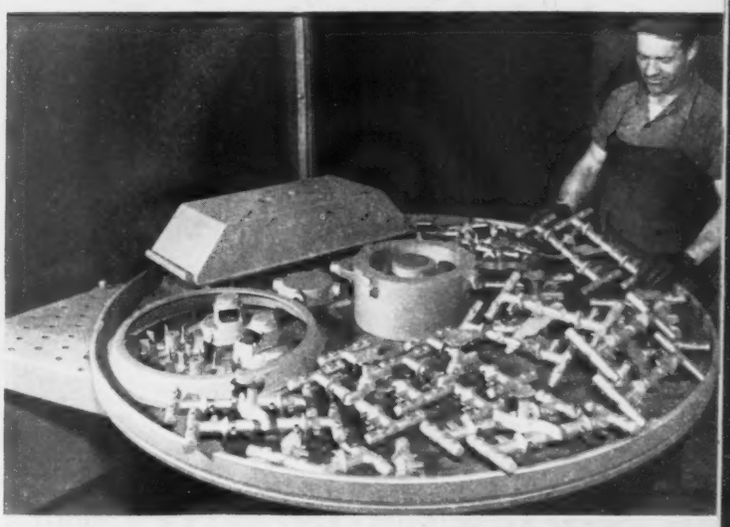
save money
like these firms have

Cuts costs 50% for Electric Steel Castings Co., Inc

One man and a helper are now cleaning 400 tons of castings monthly in a Wheelabrator Swing Table . . . a job that formerly required 4 men in an airblast room. Cleaning costs have been cut in half and plant efficiency greatly improved.

Cuts cleaning time 75% for Cherry Burrell

Installation of a Wheelabrator Swing Table slashed cleaning time at least 75% in replacing 3 tumbling mills. On some castings, the reduction in cleaning time is even greater. All castings are now cleaned in 4 to 5 hours daily where previously 8 to 12 hours a day was not sufficient to keep up with production requirements.



Reduces cleaning room man-hours for Sioux City Foundry & Boiler Co.

"Our Wheelabrator Swing Table has reduced cleaning room man-hours approximately 38% in cleaning gray iron castings ranging in weight from one pound to 600 pounds.

"Furthermore, the Wheelabrator has proved a great sales stimulant because of the foundry's ability to render almost super-service due to increased speed of finishing."

American

WHEELABRATOR & EQUIPMENT CORP.
505 S. Byrkit St. Mishawaka, Indiana

AIRLESS BLAST EQUIPMENT

Checking Fixtures, Cope and Drag Plates and Core Plates can be made for **half the usual cost** by using **Alcoa** Tool and Jig Plate*

- Moderately priced
- A cast plate—strain relieved—machined both sides.
- Thickness held to ± .010".
- Available in 11 thicknesses from ½" to 4" . . . maximum size 48" x 96".

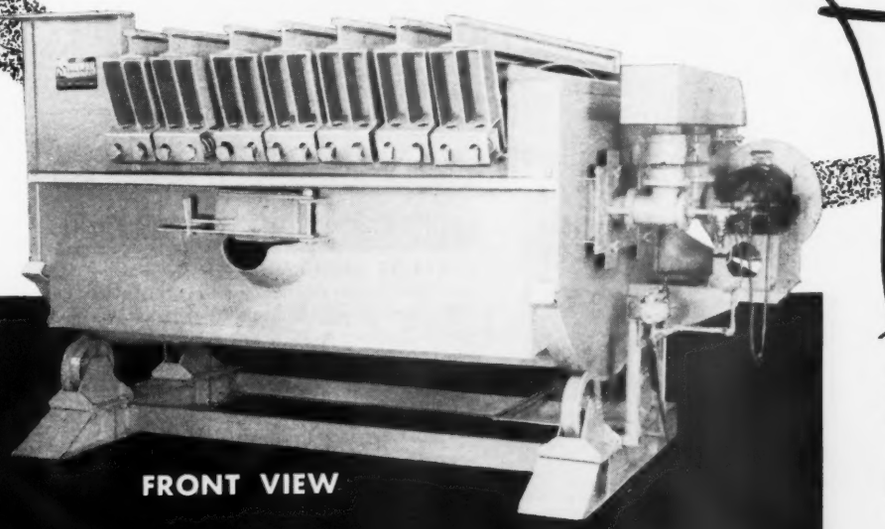
**For more information on Alcoa Tool and Jig Plate, contact your local Alcoa sales office . . . or write ALUMINUM COMPANY OF AMERICA, 1949-L Gulf Building, Pittsburgh 19, Pa.*

ALCOA

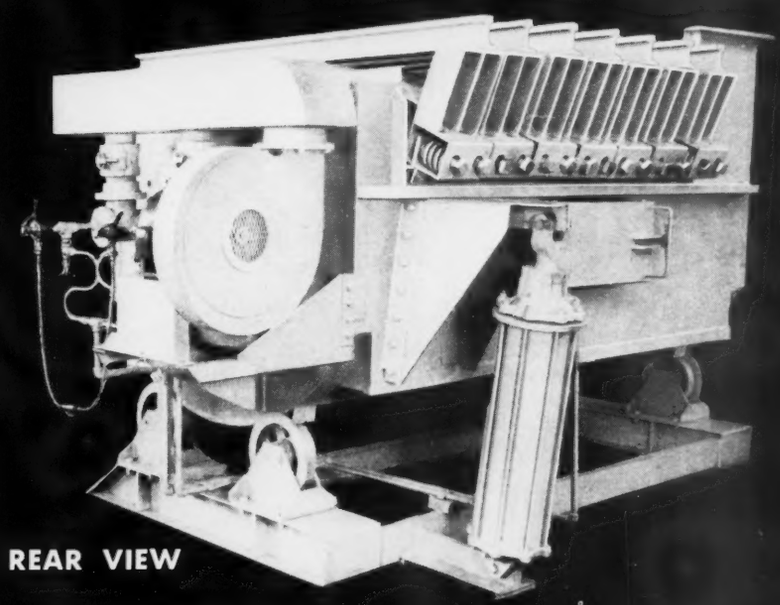
TOOL AND JIG PLATE

Another NEW STROMAN
REVERBERATORY FURNACE FOR COPPER ALLOYS or IRON!

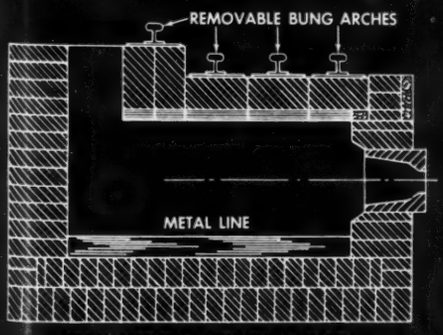
The Most Economical Furnace Ever Made to Handle Capacities from 400 to 10,000 pounds per heat.



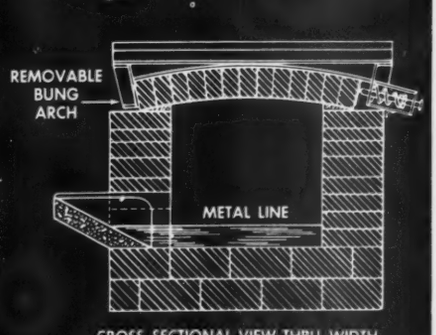
FRONT VIEW



REAR VIEW



CROSS SECTIONAL VIEW THRU LENGTH



CROSS SECTIONAL VIEW THRU WIDTH

Stroman "JC" Reverberatory Furnaces are built on the same basic ideas as the "air furnace" except that it is smaller and tilts instead of taps to pour . . . MELTING TIMES are the lowest known, ranging from 15 minutes to 2½ hours according to size of furnace and charge. It is excellent for COPPER BASE ALLOYS of low zinc content (containing not over 7% zinc). For such alloys, no more economical method has ever been devised for handling, melting, maintenance, charging, pouring and fuel consumption . . . and you can switch from one alloy to another without contamination. Castings produced from the "JC" are of excellent grain structure and free from porosity. Metal loss is lowest of any other type furnace. IRON MELTING . . . These furnaces will bring cold charges of iron up to casting temperatures of 2800° F., or they may also be used as a holding furnace of metal from a cupola. The "JC" is also highly recommended for special heats as well as production work. It has a decided advantage over a cupola in that it can be used for 6 to 8 successive heats a day. Cupolas cast just once a day. This enables a foundry to operate in slow times as a full crew is not necessary for ample production. These furnaces are gas, oil or combination gas-oil fire. They are automatically tilted and handle their metal perfectly. For greatest speed of melting and utmost economy investigate the Stroman "JC" Reverberatory . . . it will open the door to greater profits for you.

Write for full information and specifications today.

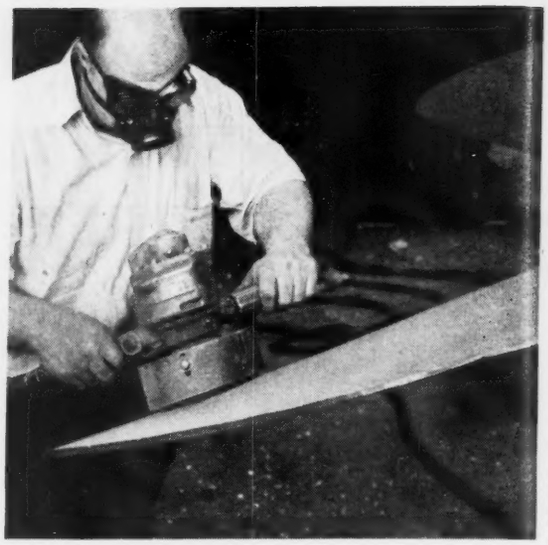
Printed in U.S.A.

STROMAN FURNACE & ENGINEERING CO.

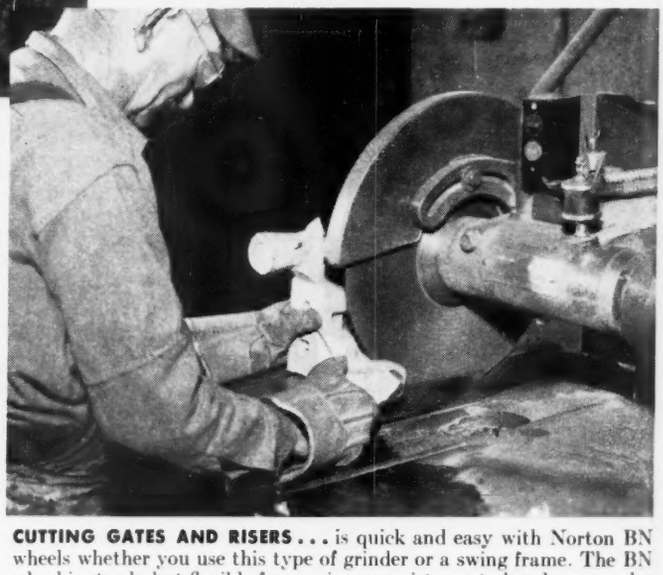
DIVISION OF

THE PETERSEN OVEN CO. • 9900 FRANKLIN AVE. • FRANKLIN PARK, ILL.

FLOORSTAND GRINDING . . . Whether you are grinding bronze castings like this worm or one of the other non-ferrous metals you can be sure of obtaining a Norton wheel of the correct abrasive, bond, grain, grade and treatment for minimum grinding costs.



PORTABLE GRINDING . . . can be done with tiny Norton mounted points in the hard-to-get-at places or with husky cup wheels on jobs like this bronze propeller. But on any job you'll like the way Norton wheels cut fast and hug the work.



CUTTING GATES AND RISERS . . . is quick and easy with Norton BN wheels whether you use this type of grinder or a swing frame. The BN wheel is sturdy but flexible for maximum resistance to breakage — also it's fast cutting and long lived.

Are the softer metals a *hard grinding problem?*

NO...If the wheel is Norton it cuts fast and the cost stays low

To keep a grinding wheel free-cutting on soft metals such as brass, bronze, aluminum, magnesium and other non-ferrous types, the answer is "Norton".

For low speed machines you have the Norton treated CRYSTOLON* grinding wheels in a vitrified bond designed to yield at just the right rate to keep the wheel surface clean, yet maintain the cutting action that speeds the work. Or, for high speed machines, Norton ALUNDUM* wheels, which again with the right resinoid bond, treatment, and grain size mean top production at low costs.

Although no two grinding operations are exactly alike, you can be sure of getting results on your job if you call on Norton facilities for exactly the correct wheel specification for your jobs. This is one good reason for Norton leadership in abrasives and abrasive products.

YOUR NORTON DISTRIBUTOR CAN HELP YOU

Your Norton Distributor will be glad to help you in wheel selection problems. He is backed by Norton's full engineering facilities or can have the Norton abrasive engineer consult with you. Or for more information on the grinding of ferrous and non-ferrous metals, write Norton Company, Worcester 6, Mass. *Export:* Norton Behr-Manning Overseas Inc., Worcester 6, Mass.

NORTON
ABRASIVES

Making better products to make other products better

*Trade-Marks Reg. U. S. Pat. Off. and Foreign Countries

Aluminum Co. of America
American Brake Shoe Co.
American Radiator Co.
Blaw-Knox Co.
Brown Industries
Buick Motor Div. of General Motors Corp.
Bucyrus-Erie Co.
Cadillac Motor Div. of General Motors Corp.
Columbia Steel Corp. (U. S. Steel Corp.)
Crucible Steel Castings Co.
Dunkirk Radiator Co.
Eclipse Aviation Division of Bendix Aviation Corp.
Electric Autolite Co.
Ford Motor Co.
Fremont Foundry Co.
G. & C. Foundry Co.
General Electric Co.
General Motors Corp. and Subsidiaries
Gilbert & Barker Co.
General Steel Castings Co.
Golden Foundry Co., Inc.
Henry Kaiser Corp.
W. O. Larson Foundry Co.
Mesta Machine Co.
F. E. Meyers & Bro. Co.
Oil Well Supply Co. (U. S. Steel Corp.)
Packard Motor Car Co.
Pittsburgh Steel Foundry Corp.
H. B. Salter Co.
Shenango Penn Mold Co.
Standard Foundry Co.
Union Brass & Metal Mfg. Co.
Union Steel Castings Co.
West Michigan Steel Castings Co.
A. C. Williams Co.
Whiten Machine Works
Whiting Corp.

Outstanding Concerns

WITH MANY IMPRESSIVE INSTALLATIONS OF

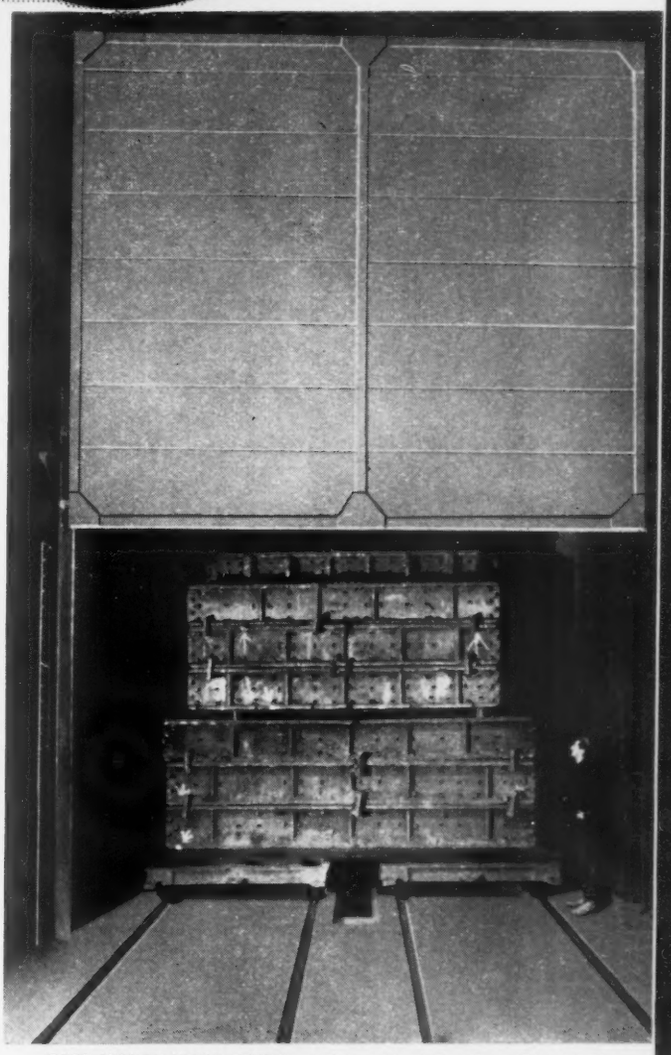
CARL-MAYER

FOUNDRY OVENS

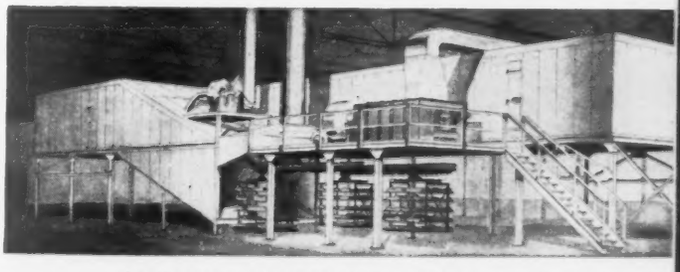
Carl-Mayer Core and Mold Ovens impress leading foundries with their many important developments. Designs have originated here for the most efficient and economical performance.

Carl-Mayer Ovens are famous for their rugged construction, too. It contributes greatly to prolonged foundry service.

May we figure on your next requirements?



CARL-MAYER MOLD OVEN at Union Steel Castings Div. of Blaw-Knox Co. Door Clearance: 17′ wide, 15′ high. Depth: 40′. Capacity: 200 tons per bake. Combination Gas-Oil Fired.



CARL-MAYER HORIZONTAL MONORAIL CORE OVEN at Eclipse Aviation Co.

CARL-MAYER RACK TYPE CORE OVENS at Golden Foundry Company.

THE CARL-MAYER CORP

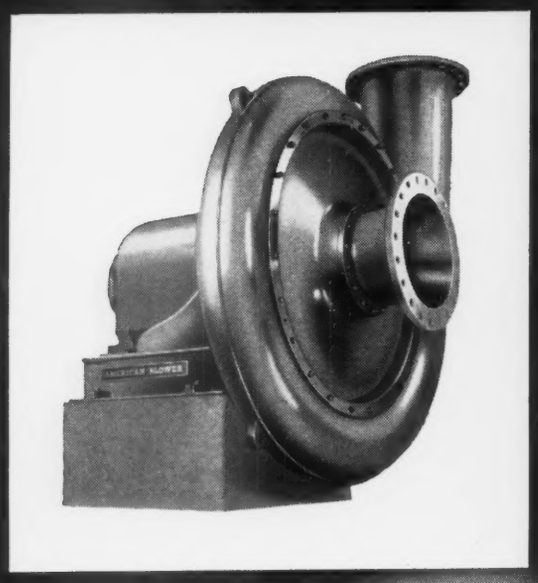
3030 Euclid Ave., Cleveland, Ohio

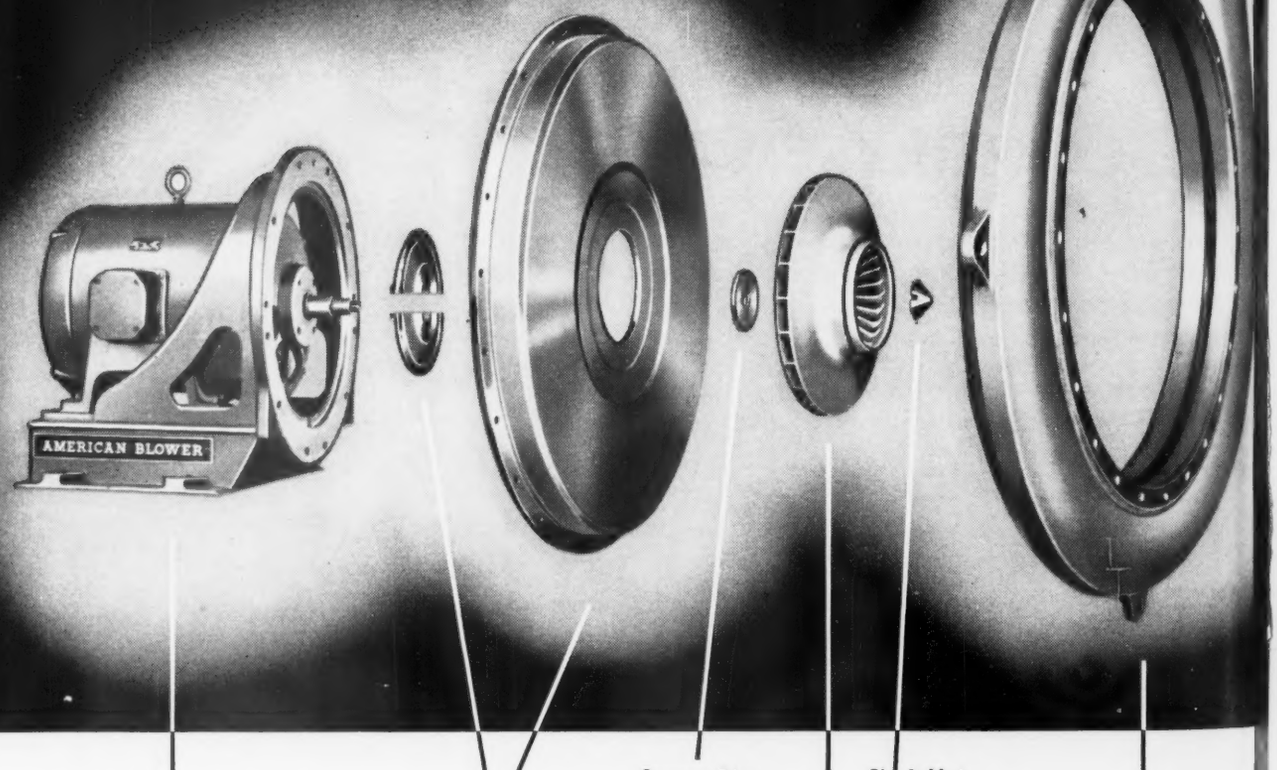
CORE AND MOLD OVENS, ALL SIZES. ALSO OTHER TYPES OF INDUSTRIAL OVENS, FURNACES.

Backed by over 30 years' experience

AMERICAN BLOWER

centrifugal





Motor — Standard NEMA construction. Short motor shaft extension and conservative impeller loads assure operation below first critical speed of rotor assembly. **Baseplate** — heavy welded steel for rigidity and accurate alignment.

Shaft Packing — Nonferrous, cast construction. No mechanical contact between stationary and rotating parts. **Backplate** — cast iron, bolts with dowel fit to baseplate.

Spacer Disc

Shaft Nut

Impeller—Shrouded, single-piece, heat-treated, cast-aluminum alloy construction. Statically and dynamically balanced. Overspeeded to 20% above maximum operating speed before assembly.

Volute Casing — Cast-iron construction. Bolts with dowel fit to back-plate. Twenty-four casing positions available in either direction of rotation.

Serving home and industry: AMERICAN-STANDARD • AMERICAN BLOWER

PENN SAND

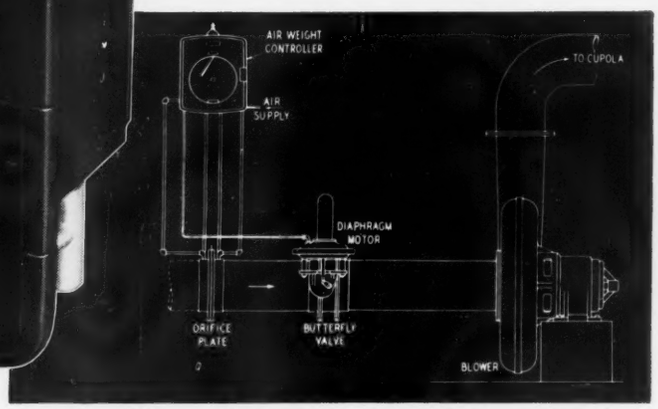
SILICA FLOUR

it makes sense . . . use the best AT NO EXTRA COST

The excellent refractoriness of PENN SAND Silica Flour reduces metal penetration, minimizes surface defects and produces castings of exceptionally smooth finish. In your mold wash, you will find that constantly uniform PENN SAND Silica Flour gives the same suspension and thickness of application every time; you always get the same even coating. ● Its high fusion point and perfect uniformity also make PENN SAND Silica Flour ideally suited as an admixture to your mold and core sands. Supplied by the country's leading producer of quality silica products, PENN SAND Silica Flour is available for immediate shipment to you in a complete range of grades. ● It makes sense to use the best silica flour when it costs no more. Write today for free samples—and on your next order be sure to specify PENN SAND Silica Flour, the most economical material for mold wash.

PENNSYLVANIA PULVERIZING COMPANY
subsidiary of PENNSYLVANIA GLASS SAND CORPORATION
producers of
MOLDING SAND • CORE SAND • SHELL-MOLDING SAND • SANDBLAST SAND
General Sales Offices: GATEWAY CENTER, PITTSBURGH, PA. • Eastern Sales Office: TRENTON TRUST BLDG., TRENTON, N. J.

Simplest Efficiency-Booster you ever saw!



Typical installation of Foxboro Air Weight Control . . . readily adaptable to either a centrifugal blower (shown in diagram) or a positive displacement blower.

Controlling cupola blast by **weight of air** cuts pigging, ups quality, gives uniform pours

There's no longer any need to let the weather upset your cupola operation. With a Foxboro Air Weight Controller you can get uniform pours, *every day.*

The Foxboro Air Weight Controller automatically and precisely controls cupola air blast by weight — delivers the correct amount of oxygen for the quantity of coke in the charge. Regardless of ups and downs in atmospheric pressure or temperature, this simple, inexpensive accessory compensates for every change—insures better combustion, more uniform heats, and saves pigging.

All you do is set the control pointer before you start the run. No further attention is necessary. Air weight is held constant as long as desired, or may be changed instantly for pours of different composition. Installation on your present blowers easily made by an experienced pipefitter.

Foxboro Air Weight Controllers are used by more than 1000 foundries. Write for Application Engineering Data Sheet 330-6, and Bulletin 268-3. **The Foxboro Company, 3211 Neponset Ave., Foxboro, Mass., U.S.A.**

FOXBORO REG. U. S. PAT. OFF. **AIR-WEIGHT CONTROLLERS**

FACTORIES IN THE UNITED STATES, CANADA AND ENGLAND

NOW YOU CAN DO JOBS LIKE THIS

IN 10 MINUTES

WITH

VIRGO® MOLTEN CLEANER

FOR FAST, SAFE, LOW-COST DESCALING —VIRGO® DESCALING SALT

Producers and fabricators of stainless and alloy steels use Virgo Descaling Salt to quickly remove scale produced by hot rolling, forging, extruding, casting, annealing.

The Hooker Process is backed by 15 years' experience in molten salt bath descaling and cleaning. Engineering, research and on-site operating assistance are part of our service.

SEND FOR THESE BULLETINS

Get the whole story on Virgo Molten Cleaner and Virgo Descaling Salt—what they are, how they work, their advantages, equipment involved, and the Hooker services you enjoy as a user of the process. Send for these bulletins today.

NEW, FAST *DESANDING, DEGRAPHITIZING* PROCESS

Saves You Up to 300 Hours per Month!

You can desand and degraphitize iron and steel castings in 10 minutes—or less—with Virgo Molten Cleaner.

Here's what you get: a *chemically clean* metal surface. No pitting or etching. No effect on dimensional stability. Any surface defect in a casting shows up clearly.

Here's how it works: a molten salt bath dissolves sand and graphite from every nook and cranny of the most intricate casting. A water quench, a dip in dilute acid, and a brief hosing with water complete the job.

You can use Virgo Molten Cleaner for stress relieving, too. Grey iron, carbon steels and some alloy steels can be stress relieved *while desanding*—in much less time than is required in a furnace.

This fast, safe process is easily adapted to your production methods. For full details, mail the coupon or write us today.

HOOKER CHEMICALS ®

From the Salt of the Earth

HOOKER ELECTROCHEMICAL COMPANY

20 FORTY-SEVENTH ST., NIAGARA FALLS, N. Y.
NEW YORK, N. Y.
WILMINGTON, CALIF.
TACOMA, WASH.
CHICAGO, ILL.

1-1465

Hooker Electrochemical Company
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Please send me Bulletins checked: Virgo Descaling Salt ☐ Virgo Molten Cleaner ☐

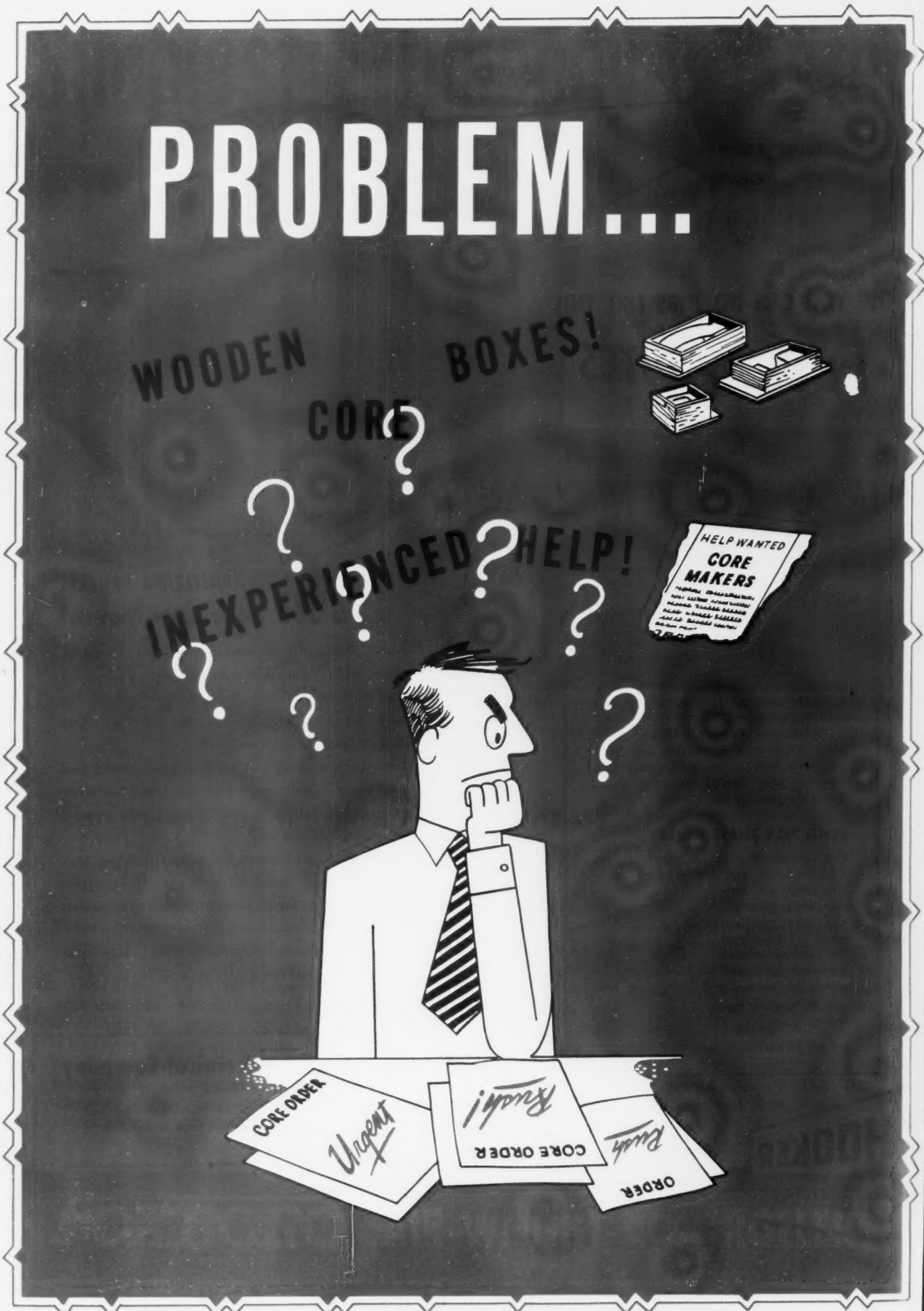
NAME_____

TITLE_____

COMPANY _____

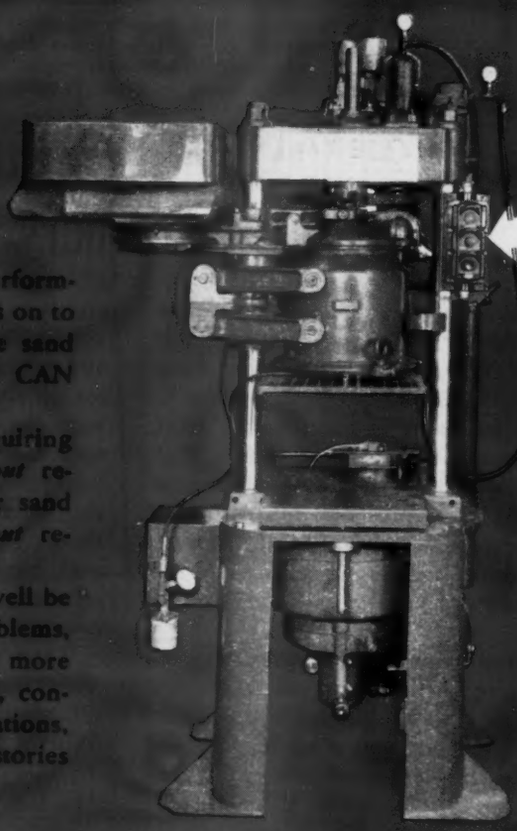
ADDRESS _____

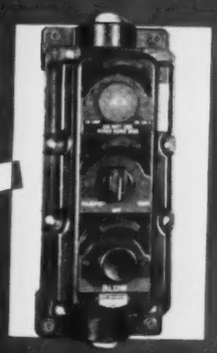
CITY_____ ZONE____ STATE____


PROBLEM...
WOODEN BOXES!
CORE ?
INEXPERIENCED ? HELP!
HELP WANTED
CORE MAKERS
CORE ORDER
Urgent
CORE ORDER
Rush!
ORDER

SOLUTION...

The new Pulsator model SAN-BLO will boost core production by blowing wooden core boxes and core sand mixtures you've been hand-ramming





If you must speed up core production, but find yourself stymied like the chap on the opposite page, then you need the new Pulsator model SAN-BLO. This unique core blower matches the performance of any other blower—then goes on to blow wooden core boxes and core sand mixtures NO OTHER MACHINE CAN BLOW!

And it does these things *without* requiring expensive core box rigging—*without* requiring a change of blow plate or sand magazine for each job—and *without* requiring experienced help.

Yes, the Pulsator SAN-BLO may well be the solution to your core room problems, in which case you should find out more about it. Send for Catalog No. P-1, containing complete description, specifications, operating instructions and case histories of performance.

"PUSH BUTTON" CORE BLOWING

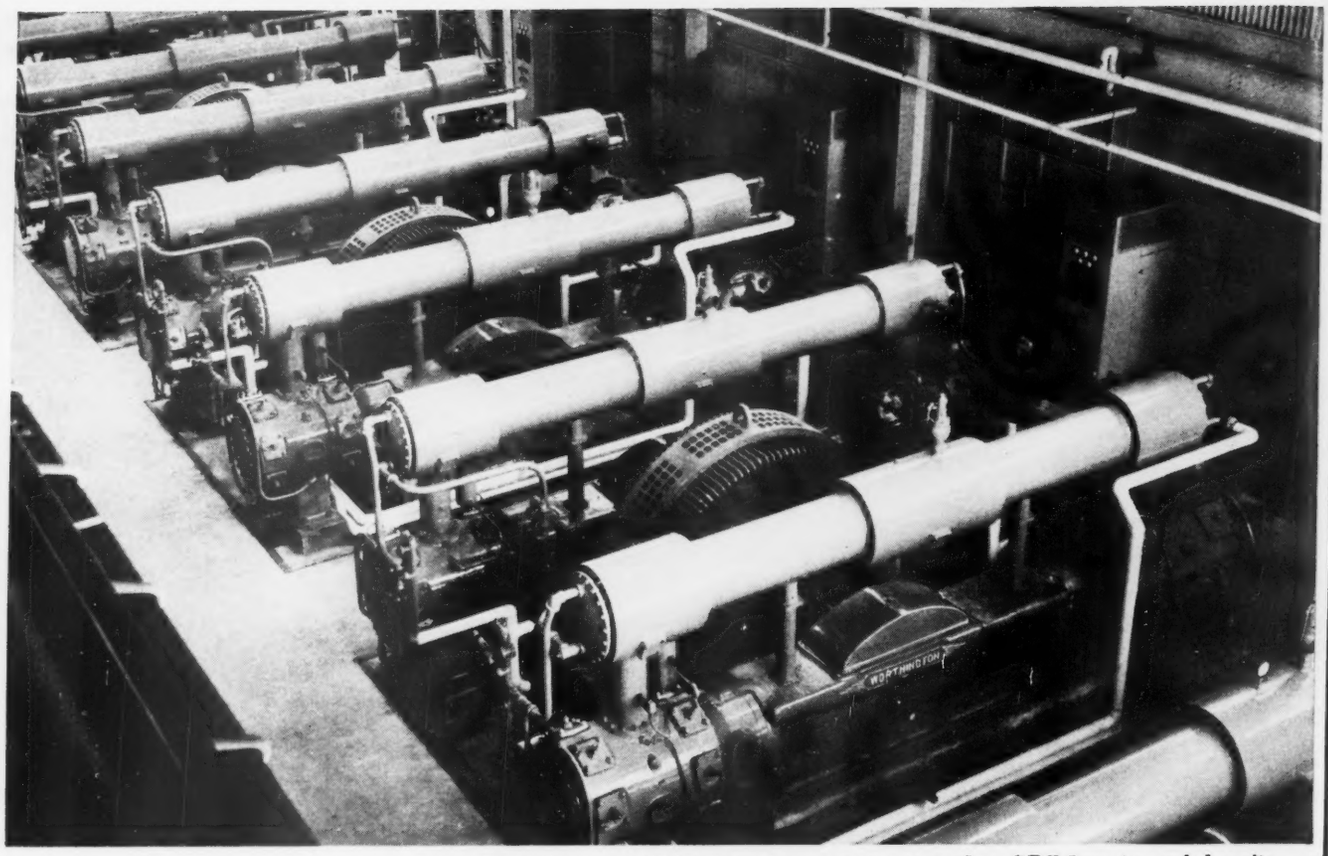
All your operator has to do is turn a knob to set the machine for metal boxes or wooden boxes—then press the blow button—and the core box is ready for removal. A perfect core in a matter of seconds—the push button way, the SAN-BLO way!

FEDERAL

The **FEDERAL FOUNDRY SUPPLY** *Company*

4600 EAST 71st STREET, CLEVELAND 5, OHIO

SALES OFFICES: NEW YORK • CLEVELAND • DETROIT • MILWAUKEE • LOS ANGELES



SIX WORTHINGTON HORIZONTAL-DUPLEX COMPRESSORS—five ODC-2 water-cooled units (background, left) with 9414 cfm displacement each, and one DC-2 two-stage 1858-cfm unit—make up the entire air supply at the new Brookpark Village, Ohio, foundry and engine plant of Ford Motor Company. Foundry will produce all blocks and heads for the engine plant.

Ford installs 41,500 cfm of Worthington compressors to supply air to new foundry and engine plant

When you build a foundry and engine plant as large as those Ford Motor Company recently completed at Brookpark Village, Ohio, compressed air becomes a major consideration.

That's why you'll find they've installed six giant Worthington compressors in the power house that supplies compressed air to the foundry and engine plant together totaling over 2,000,000 square feet of floor space. Ford is expecting a lot of hard, continuous and efficient work from these big units—and the experience of industry everywhere says that they'll get it.

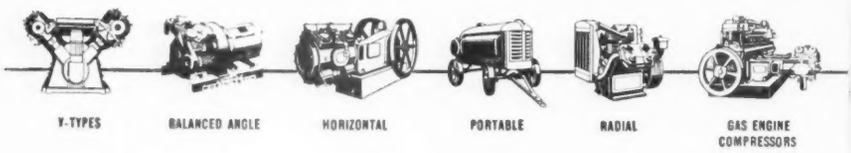
A mere look at these ruggedly built units suggests their dependability, but what surprises some new users is their high operating efficiency. Worthington horizontal compressors assure you of air as you need it . . . in the quantities you need—and most of all, they give it to you at the lowest possible cost.

Worthington features that mean lower operating and maintenance costs are: (1) *the variable capacity control* that provides exactly the air volume needed regardless of load conditions *also makes possible* lower operating temperatures at part loads, reduced part load power consumption, and minimum cylinder and ring wear with less carbon deposits on valves. (2) *Worthington's exclusive Feather* valve*—simplest, lightest, and most efficient valve made and (3) the high *efficiency intercooler* that needs less water, less power, less attention.

There's a Worthington compressor built to supply your compressed-air requirements dependably and efficiently. Write today for Bulletin L-675-B1B to Worthington Corporation, Compressor Division, Buffalo 5, New York.

*Reg. U. S. Pat. Off.

K.2.7



No Other Compressor Will Outperform a Worthington

WORTHINGTON

Compressors

Here's More Proof of B&W Allmul Firebrick Performance

BILLET HEATING FURNACE

"ALLMUL more than doubles life of lining"

A large manufacturer was faced with high refractory maintenance in the discharge zone of a side-discharge billet heating furnace. Combustion chamber temperatures were 2600F-2700F. Production was high—a billet was discharged every 30 seconds. Thermal shock and high temperatures caused various semi-mullite refractories to fail in 5 to 6 months. Then this area was relined with B&W Allmul Firebrick. Result: Allmul stood up for 13 months—2 to 2½ times as long!

ELECTRIC FURNACE ROOF

"ALLMUL lasts 3 to 6 times as long"

In a six-ton electric furnace, handling 15 tons of stainless steel per charge, super duty firebrick had to be replaced every 20-40 heats. Pouring temperature of the metal was in excess of 3100F, with higher temperatures attained in the furnace during periods of oxygen introduction. The owner installed B&W Allmul Firebrick, hoping for a life of 80 heats. Allmul in the first roof lasted for 122 heats—42 more than hoped for. The second roof of Allmul went to 131 heats! Result? Additional orders for B&W Allmul.

INDIRECT ARC FURNACE

"All furnaces converted to ALLMUL after comparative tests"

A large company making alloy steel castings has several indirect arc furnaces melting various alloys, with pouring temperatures varying from 2700F to 3100F. With highest temperature alloys, semi-mullite brick burned out in 6-10 heats. B&W Allmul, which cost approximately the same, showed no appreciable wear after 20 heats. On alloy steels in general, this customer reports far less slag formation (an indication of reduced refractory wear) with Allmul than with any other refractory used. Result: All furnaces are being relined with B&W Allmul Firebrick.

FORGE FURNACE HEARTH

"ALLMUL lengthens life, keeps dry hearth"

A drop forge company was faced with this problem on its 72" wide slot-type furnace operating at 2350F-2400F: Low cost refractories gave soupy slag on the hearth, affecting product quality and die life. More expensive refractories, including chrome plastic and chrome firebrick, eliminated liquid slag, but their life was so short that their use could not be justified economically. A completely new hearth was installed consisting of 4½" of Allmul on top of 2½" of B&W Junior and 5" of B&W IFB. Result: Completely dry bottom; easy removal of scale; *and Allmul was in good condition after 5 months of operation.* Based on this performance, additional Allmul hearths were ordered.

Yes, the facts about B&W Allmul Firebrick speak for themselves. This fused mullite brick is proving its economy in dozens of severe service applications. The reason? A unique combination of refractory properties—high hot load strength, high resistance to spalling, good volume stability, a high melting point of 3335F—all resulting in lower furnace costs. Want more data? Write for Bulletin R-29.

BABCOCK & WILCOX

THE BABCOCK & WILCOX CO.
REFRACTORIES DIVISION
GENERAL OFFICES 161 EAST 42ND ST., NEW YORK 17, N.Y.
WORKS: AUGUSTA, GA.

R-43E

B&W REFRACTORIES PRODUCTS — B&W Allmul Firebrick • B&W 80 Firebrick • B&W Junior Firebrick • B&W Insulating Firebrick B&W Refractory Castables, Plastics and Mortars • OTHER B&W PRODUCTS—Stationary & Marine Boilers and Component Equipment... Chemical Recovery Units . . . Seamless & Welded Tubes . . . Pulverizers . . . Fuel Burning Equipment . . . Pressure Vessels . . . Alloy Castings

"Our new 2F SIMPSON Mix-Muller $3,500.00 per year in materials and

. . . says Mr. Spencer Harris, plant superintendent
AMERICAN ABRASIVE METALS CO., IRVINGTON, N. J.

The advantages of using Simpson and National equipment is an old story to the American Abrasive Metals Co. of Irvington, N.J.—for they have been using a No. 2 Simpson for over 25 years in producing such well-known products as FERALUN, BRONZALUN, ALUMALUN, as well as a line of gray iron, non-ferrous and alloy iron jobbing castings.

In fact, when we first introduced the new 2F and 3F Simpson Mix-Mullers, management was frankly dubious that any new machine could out-produce their old No. 2 Simpson, and save enough to quickly amortize a new investment.

But once the decision was made to install a new 2F Mix-Muller, the results far exceeded their expectations. Here's what the new 2F unit has accomplished:

(1) *Permits the use of ALL synthetic sands;* (2) *Use of bonding materials cut by one-third;* (3) *Has eliminated all muller overtime—operator spends only 30 minutes cleaning area and machine;* (4) *Has reduced mulling cycle materially;* (5) *Has maintained highest casting quality—a MUST in producing flat work; and* (6) *An over-all saving in materials and labor of about $3500 per year.*

To further quote Mr. Harris—*"we are thoroughly pleased with our new muller and feel that our experience could be of value to others."*

We think so, too . . . why don't *you* investigate the time and money-saving ability of the 2F and 3F Simpson Intensive Mix-Mullers? *Write for details.*

AMERICAN ABRASIVE METALS CO.
IRVINGTON, NEW JERSEY
PHONE: ESSEX 3-7060
FERALUN • BRONZALUN • ALUMALUN • GRATING • FERROX • FERA-FLOW • MARTEX

National Engineering Co.
549 W. Washington Blvd.
Chicago 6, Ill.

On synthetic sands, bonding materials (fire clay and bentonite) have been reduced by 1/3. The resultant sand has better flowability and permeability at similar green strengths. Reduced use of materials (bonds) results in approximately $2500.00 savings per year (including costs of receiving material). Muller operator used to average fifteen hours overtime per week to keep machines supplied. Since installation of our 2F, all Muller overtime has been eliminated and man spends 1/2 hour cleaning area and machine. Sand control is vital since we largely produce flat work. Mulling cycle has been reduced materially.

We thank you sincerely for your interest.

Yours truly,

Spencer Harris
Plant Supt.

SH/ds
enc

is saving us labor costs!"

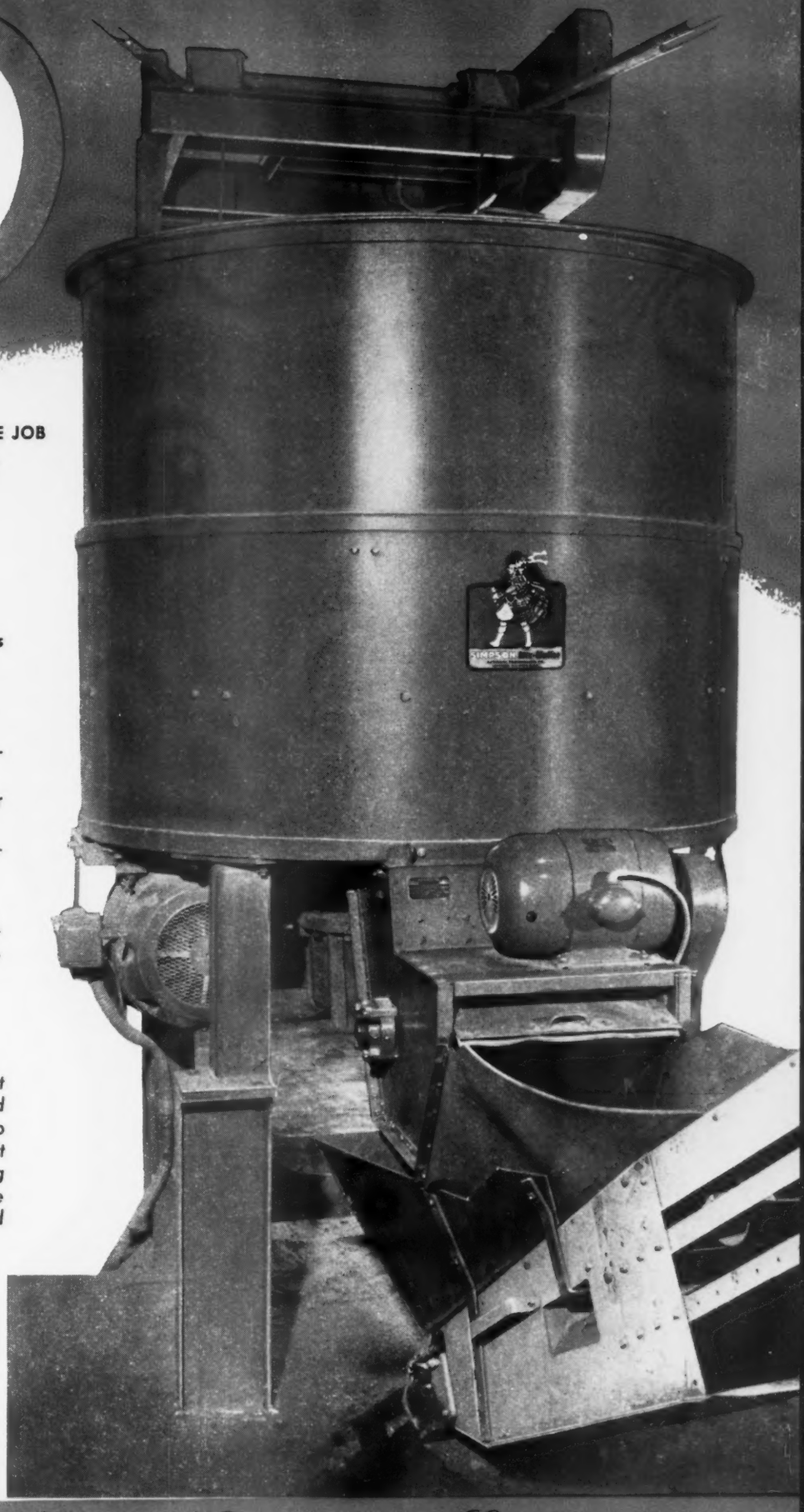
HERE'S THE 2F SIMPSON UNIT THAT'S DOING A MAN-SIZE JOB FOR AMERICAN ABRASIVE . .

. . . and here are some of the advantages you can get by using 2F and 3F

SIMPSON MIX-MULLERS:

1. Most thorough mulling action ever developed.
2. Greatest flexibility of operation ever offered. *(Mulls all sands efficiently.)*
3. Greater mulling speed—faster discharge.
4. Large batch capacity.
5. Greater uniformity—better sand control.
6. Much simpler, safer operation and maintenance.
7. Less horsepower required.*

**REMEMBER . . . In the Simpson the weight of the sand is carried on the bedplate, and the only power required is that necessary to roll the Mullers over the sand, and repile it in the Muller path. Using a true Mulling action, in a deep, horizontal sand bed, the most efficient conditions are obtained throughout every Mulling cycle.*



National Engineering Company

608 Machinery Hall Bldg. • Chicago 6, Illinois

SIMPSON *Intensive* **MIX-MULLERS**

Manufacturers and Selling Agents: For Continental European Countries — George Fisher, Ltd., Schaffhausen, Switzerland; for British Possessions — August's Limited, Halifax, England; for Canada — Dominion Engineering Co., Ltd., Montreal; for Australia and New Zealand — Gibson, Battle & Co., Pty., Ltd., Sydney, for Argentina, Brazil and Uruguay — Equipamentos Industriais EISA Ltda., Sao Paulo, Brazil; for Mexico — CASCO ,S. De R.L., Mexico, D.F.

HERE'S PROOF!

MULTI-WASH DUST COLLECTOR IS 99.9% EFFICIENT

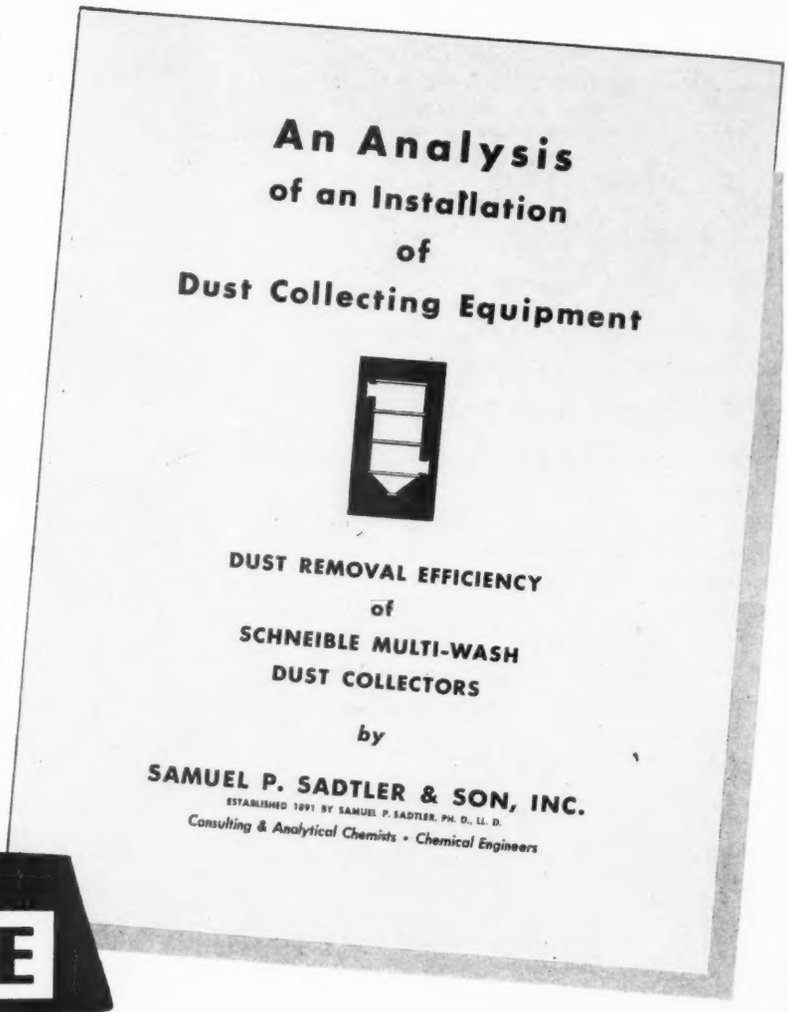
We have often stressed the efficiency of the MULTI-WASH dust collector but to prove our point we have had a scientific analysis made under actual production load by an unbiased outside laboratory.

A recent installation for a large nationally known company, was tested by Samuel P. Sadtler & Son, Inc. of Philadelphia, and proved to be 99.9% efficient. This high efficiency was even better than we had anticipated.

In the above mentioned test, some of the material removed was below sub-micron sizes and could not be appraised which might well account for being just a fraction of one per-cent under perfection.

For complete details of this test we offer a reprint of Samuel P. Sadtler analysis in its original form. This is available upon request and without obligation. Write for your copy today.

CLAUDE B. SCHNEIBLE CO.
P. O. Box 81, North End Station
Detroit 2, Michigan



SCHNEIBLE

CLAUDE B. SCHNEIBLE CO.
P. O. Box 81, North End Station
Detroit 2, Michigan

MAIL THIS *TODAY!*

Gentlemen:

Please send me ☐ copies of your Sadtler Analysis booklet without obligation.

Name _____ Title _____

Company _____

Address _____

City _____ State _____

PRODUCTS:

- Multi-Wash Collectors
- Uni-Flo Standard Hoods
- Uni-Flo Compensating Hoods
- Uni-Flo Fractionating Hoods
- Water Curtain Cupola Collectors
- Ductwork
- Velocitrap
- Dust Separators
- Entrainment Separators
- Settling and Dewatering Tanks
- "Wear Proof" Centrifugal Slurry Pumps

Late Foundry News

OCTOBER 24, 1952

PLANT EXPANSION: About one-half of the facilities expansion program for defense production, aided by certificates of necessity for rapid tax write-off, was in place at mid-year, according to DPA. By the end of next year 86 per cent is scheduled to be completed and operating. Foundries recently granted certificates of necessity include: Continental Foundry & Machine Co., $456,750 at Wheeling, W. Va., and $561,700 at East Chicago, Ind.; Avondale Marine Ways Inc., New Orleans, $399,735; Doehler-Jarvis Corp., Toledo, O., $880,000.

PRESS CASTINGS: Close to 30,000 tons of steel castings will be required for the huge presses the Air Force has ordered from six contractors—Baldwin-Lima-Hamilton, E. W. Bliss, Loewy, Lombard, Mesta and United Engineering. Although many of the castings are in the large sizes for which U. S. capacity is tight, bulk of the tonnage will be produced in this country. However, one press builder has ordered several thousand tons abroad, most of it from England, Scotland, France and Italy, some from Japan and Canada.

MORE PIG IRON: Niagara River Steel Corp., Syracuse, N. Y., a new company, has a $40 million certificate of necessity for the pig iron and coke producing plant it will build near Buffalo. Officials of Koppers Co. and Colorado Fuel & Iron Corp. are among the company's directors. Michigan Iron & Coke Co. has bought a $1.6 million site near St. Clair for its new plant. This merchant iron and coke facility is planned for completion in early 1954.

FEMA ELECTS: Officers chosen by the Foundry Equipment Manufacturers Association at its recent annual meeting include: President, Claude B. Schneible, Claude B. Schneible Co., Detroit; vice president, William B. Wallis, Pittsburgh Lectromelt Furnace Corp., Pittsburgh; executive secretary-treasurer, Arthur J. Tuscany. Next year's annual meeting of the association will be held at White Sulphur Springs, W. Va., Oct. 15-17.

RATINGS OUT: Foundries no longer need pass along ratings with orders they place for equipment. The orders can be filled by the manufacturers without such ratings. For the assistance of any company requiring special priorities assistance, NPA has issued a new form, NPAF-138 Revised. To be used to meet special cases where normal delivery of material or equipment will not suffice, the form is obtainable from NPA field offices or in Washington.

GRAY IRON OFFICERS: Henry J. Trenkamp, president, Ohio Foundry Co., Cleveland, is new president of the Gray Iron Founders' Society. Also elected at the society's recent annual meeting were: Vice president, Thomas I. Curtin, Waltham Foundry Co., Waltham, Mass.; treasurer, Walter O. Larson, W. O. Larson Foundry Co., Grafton, O.; secretary, C. H. Ker, Dalton Foundries Inc., Warsaw, Ind.

METAL SHOW: Castings predominated the engineering materials exhibited at the American Society for Metals Exposition in Philadelphia. Foundry displays, more numerous than ever before, showed a wide variety of gray iron, malleable and steel castings, including special process, precision investment and shell mold cast products. Gray Iron Founders' Society and Steel Founders' Society of America both conducted informative exhibits on casting applications. Installed as president of the ASM for 1952-53 was Ralph L. Wilson, director of metallurgy, Steel & Tube Division, Timken Roller Bearing Co., Canton, O.

CIVILIAN GOODS: Allotments of controlled materials to civilian goods manufacturers for first quarter 1953 have been set by NPA at 50 per cent of base period consumption for copper and .55 per cent for aluminum. This compares with 35-40 per cent and 30 per cent, respectively, in first quarter 1952. Initial allotment for steel is set at 33 per cent, but actual tonnage is expected to be increased by carry-over of fourth quarter allotments for which tonnage was not received.

ADVANCE ORDERS: An amendment to Direction 1 of NPA Order M-16 permits brass and bronze foundries who receive quarterly allocations to place advance orders for copper raw material deliveries in each of the two months succeeding the quarter to which the allocations applied.

ALLOYS: Allocation of alloying materials to melters has been changed by NPA from a monthly to a quarterly basis. Users requiring delivery of and authorization to use any restricted alloying material during first quarter 1953 should file Form NPAF-114 by Dec. 7. Subsequent applica-

tions should be made by the seventh day of the month preceding each quarter.

PIPE SPECIFICATIONS: New specifications for two weights of cast iron soil pipe and fittings have been proposed by the Cast Iron Soil Pipe Institute. They are expected to result in important savings in construction costs and permit plumbers to handle the pipe more efficiently. They also involve heavy expenditures in new patterns by pipe manufacturers.

ALUMINUM EXPANSION: Goal for primary aluminum production capacity has been raised 200,000 tons annually by DPA. Proposed goal for Jan. 1, 1955 now is set at 1,746,000 tons; domestic production in 1950 was 719,000 tons. Including imports and secondary ingot production, total supplies are expected to reach 2,375,000 tons, compared with 1,206,700 tons in 1950.

HOUGH SOLD: International Harvester Co. has acquired the stock of Frank G. Hough Co., Libertyville, Ill., and will operate it as a wholly owned subsidiary. No immediate change in the Hough organization is indicated.

EARNINGS SURVEY: About 230 gray iron foundries will receive the OPS questionnaire intended to determine if the industry is entitled to higher prices for its products. Basis for the decision will be a comparison of present earnings with 85 per cent of the average for the best three years between 1946 and 1949. Similar sampling is planned for other branches of the industry.

MISCELLANY: Bennett S. Chapple Jr., United States Steel Co., Pittsburgh, has been named assistant administrator, NPA, in charge of the Metals and Minerals Bureau, succeeding William M. Day, Michigan Bell Telephone Co. . . . Cleveland has been announced as site of the 1954 AFS Congress and Show, the date May 8-14. The 1953 meeting in Chicago will not include an exhibit . . . A committee of the American Iron and Steel Institute is sponsoring research projects which, it is hoped, will recover a million tons of metal scrap annually from big city rubbish dumps . . . New wage contract of the Michigan Pattern Manufacturers Association with the AFL Pattern Makers Association gives the latter an hourly 15-cent raise plus fringe benefits.

PRICES OF FOUNDRY METALS AND COKE

(As of Oct. 24, 1952)

FOUNDRY COKE

(Per net ton, f.o.b. ovens)

BEEHIVE	
Connellsville	$16.50-17.50
New River	20.80
Wise County	15.95
OVEN	
Birmingham	$20.30
Chicago	23.00
Detroit	24.00
Erie, Pa.	23.50
Everett, Mass.	24.80
Indianapolis	22.75
Kearney, N. J.	22.75
Milwaukee	23.75
Painesville, O.	24.00
Philadelphia	22.70
Neville Island (Pittsburgh)	23.00
Portsmouth, O.	22.50
St. Louis (delivered)	25.40
Swedeland, Pa.	22.60
Terre Haute, Ind.	22.50

PIG IRON

(Per gross ton, f.o.b. furnace)

	No. 2 Foundry	Malleable
Bethlehem, Pa.	$57.00	$57.50
Birmingham	51.38	....
Buffalo	55.00	55.50
Chicago	55.00	56.00
Cleveland	55.00	55.00
Everett, Mass.	59.25	59.75
Fontana, Calif.	61.00	....
Geneva, Utah	55.00	....
Granite City, Ill.	56.90	57.40
Lone Star, Tex.	51.00	51.00
Neville Island (Pittsburgh)	55.00	55.00
Steelton, Pa.	57.00	57.50
Swedeland, Pa.	59.00	59.50
Toledo, O.	55.00	55.00
Troy, N. Y.	57.00	57.50
Youngstown, O.	55.00	55.00

NONFERROUS INGOT

BRASS AND BRONZE: 85-5-5-5—27.25c; 88-10-2—40.00c; 80-10-10 — 33.00c; No. 1 yellow — 23.25c.

ALUMINUM: 99 per cent plus, primary ingots 20.00c. Secondary No. 12 alloy 19.50c. Deoxidizing grades: No. 1 18.80c; No. 4 18.20c.

MAGNESIUM: 99.8 per cent standard ingots 24.50c, f.o.b. Freeport, Tex.

COPPER: Electrolytic 24.50c, Connecticut valley; Lake 24.62½c, delivered.

ZINC: High grade 14.85c, delivered. Die casting alloy 18.00c, delivered.

IRON AND STEEL SCRAP

(Ceiling prices per gross ton as established by the Office of Price Stabilization)

	*No. 1 Bundles	Cast Steel	**Steel, 2 ft & less	Punchings, Plate Scrap	Cast Iron Briquets
Birmingham	$39.00	$44.00	$39.00	$41.50	$39.00
Buffalo	43.00	48.00	43.00	45.50	43.00
Chicago	42.50	47.50	42.50	45.00	42.50
Cincinnati	43.00	48.00	43.00	45.50	43.00
Cleveland	43.00	48.00	43.00	45.50	43.00
Detroit	41.15	46.15	41.15	43.65	41.15
Eastern Pa.	42.50	47.50	42.50	45.00	42.50
Los Angeles	35.00	40.00	35.00	37.50	35.00
Pittsburgh	44.00	49.00	44.00	46.50	44.00
San Francisco	35.00	39.00	35.00	37.50	35.00
St. Louis	41.00	46.00	41.00	43.50	41.00
Seattle	35.00	40.00	35.00	37.50	35.00

Above delivered prices are ceiling levels at basing points indicated. * Applies to dealer and industrial scrap; No. 1 and No. 2 heavy melting steel are $1 less; No. 1 railroad heavy melting is $2 higher. **$2 higher if 1 ft or under.

CAST IRON SCRAP

No. 1 cupola cast	$49.00
Heavy breakable cast	45.00
Burnt cast iron	41.00
Cast iron brake shoes	41.00
Stove plate	46.00
Clean auto cast	52.00
Unstripped motor blocks	43.00
Iron wheels, No. 1	47.00
Malleable	55.00
Drop broken machinery cast	52.00

Above ceiling prices, per gross ton, are f.o.b. shipping point. Add transportation charges to obtain delivered prices at any foundry.

Casting by Walworth Company, New York 17, N. Y.

What *SHELL MOLDING* means to Foundries and their Customers

The new shell molding process benefits both foundries and users of castings alike. The thin, lightweight shell molds, made of fine-grained sands bonded with BAKELITE Phenolic Resins, yield ferrous and non-ferrous castings that are almost pattern-smooth. The process can result in new production advances for foundries, reduced machining costs, increased operating efficiency. Some of its advantages—

FOR FOUNDRIES

- Molds are light in weight, are easily handled and moved about.
- Molds can be stored until needed without deteriorating.
- Ninety to ninety-five per cent less sand is used.
- More good castings are yielded per ton of metal poured.
- Laborious surface finishing of castings is reduced.

FOR USERS OF CASTINGS

- Castings have almost pattern-smooth surfaces, and fine detail.
- Pieces are cast to closer finished dimensions—tolerances as close as .003 to .005 inches per inch.
- Higher percentage of sound, uniform castings means fewer rejects.
- Reduced machining operations result in lowered production costs.

BAKELITE
TRADE-MARK

PHENOLIC RESINS FOR SHELL MOLDING

TRADE MARK

BAKELITE COMPANY
A Division of
Union Carbide and Carbon Corporation
UCC
30 East 42nd Street, New York 17, N. Y.
In Canada:
Bakelite Company (Canada) Ltd., Belleville, Ont.

Learn more about Shell Molding!
Send for this Free Booklet!

BAKELITE COMPANY, Dept. ER-29
A Division of Union Carbide and Carbon Corporation
30 East 42nd Street, New York 17, N. Y.
Please mail my free copy of the Booklet C-8, "BAKELITE Phenolic Resins for the Shell Molding Process."

Name _____ *Title* _____

Company _____

Street _____ *City* _____ *Zone* _____ *State* _____

SNAGGING . . .

Only CARBO

TRADE

"Carborundum" and "Aloxite" are registered trademarks which indicate manufacture by The Carborundum Company, Niagara Falls, New York

agging Wheels by CARBORUNDUM offer you the ideal cost-cutting combination the *right* abrasive grain and the *right* bond, tailored to *your* work and *your* uipment. Check the table:

EST FOR SNAGGING	STEEL castings and forgings—and high tensile non-ferrous materials	IRON cast, grey, chilled—hard malleables and low tensile non-ferrous materials
ON HIGH-SPEED GRINDERS (9500 SFPM and lower)	*Use* "ALOXITE" aluminum oxide B5 resinoid wheels	*Use* "CARBORUNDUM" silicon carbide B5 resinoid wheels
	THE NEW B5 RESINOID BOND imparts for greater strength to wheels—provides high resistance to mechanical shock and heat shock. This means added safety and lower fatigue, in addition to a high cutting rate and long wheel life.	
ON LOW-SPEED GRINDERS (6500 SFPM and lower)	*Use* "ALOXITE" aluminum oxide V10 vitrified wheels... tough, sharp grain in a new, rugged long-lasting bond especially developed for this service	*Use* "CARBORUNDUM" silicon carbide VD vitrified wheels... newly developed blocky, friable abrasive in a new high-efficiency bond

r every abrasive job in your foundry—whether your need is for straight wheels, c wheels, mounted points, cones and plugs, core files—there's an abrasive prod- by CARBORUNDUM designed to do the job better, faster, at lower cost.

DER FROM YOUR CARBORUNDUM DISTRIBUTOR TODAY. He's your best bet for complete cks, prompt delivery, experienced counsel on latest developments in the field. You'll find listed in the yellow pages under "Abrasives." Phone him today—it's to your profit!

This "tell-all" booklet is FREE!

Write Dept. F 81-80 for your copy

RUNDUM

MARK

offers ALL abrasive products...to give you the proper ONE

YOU'LL DO A BETTER JOB

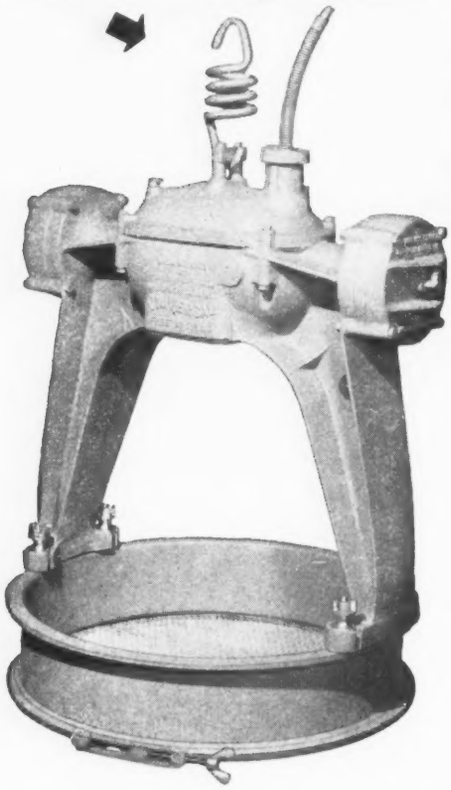
with **H. V. ADAMS DESIGNED**

HIGH EFFICIENCY FOUNDRY TOOLS

"UNIVERSAL FREE WHEELING"

FOUNDRY SAND RIDDLE

with the Double Eight Vibration

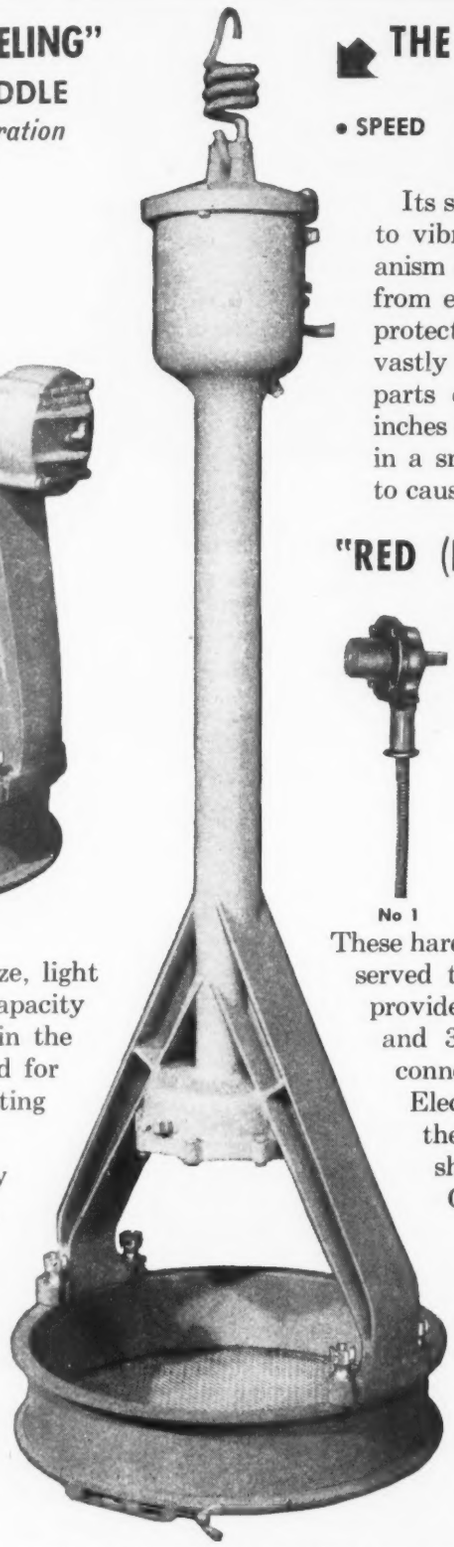


Because of its convenient size, light weight and good riddling capacity it long has been a favorite in the foundry. It also can be used for mixing core sand or for sifting sand directly into molds.

The mechanism is entirely enclosed protecting it from harmful dust and grit.

The main frame is cast in very strong tough aluminum.

It uses quick change ferruled sieves with 20 in. diameter sifting area. There are no loose wires to harm hands.



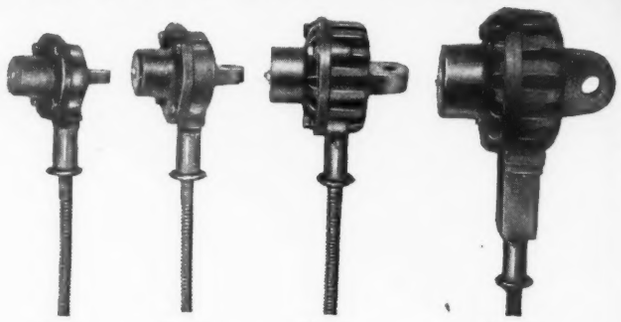
THE "ROTOPLANE" SPEED SIFTER

WILL GIVE YOU

- **SPEED**
- **ECONOMY**
- **SAFETY**
- **LONGER LIFE**
- **GREATER SIFTING CAPACITY**

Its sturdy one-piece frame and long shaft add to vibration effectiveness. The sealed-in mechanism assures protection of motor and bearings from exposure to dust and grit. This sealed in protection and "Rotoplane's" free-rotary action vastly increase bearing life. No exposed moving parts endanger the operator. Sieves have 20 inches diameter clear sifting area—are mounted in a smooth steel ferrule with no jagged edges to cause dangerous cuts and scratches.

"RED (Devil) ELECTRIC" VIBRATORS



No 1 No. 2 No. 5 No. 9

These hard hitting Adams designed Vibrators have served the foundries for over 30 years. They are provided with a 6 foot 3 wire authorized cable and 3 wire grounded connector which, when connected with our 3 wire grounded Red Electric Knee Switch, automatically grounds the vibrator protecting the worker from shock. The vibrators have passed the U. S. Government code inspection.

Other Foundry Products:

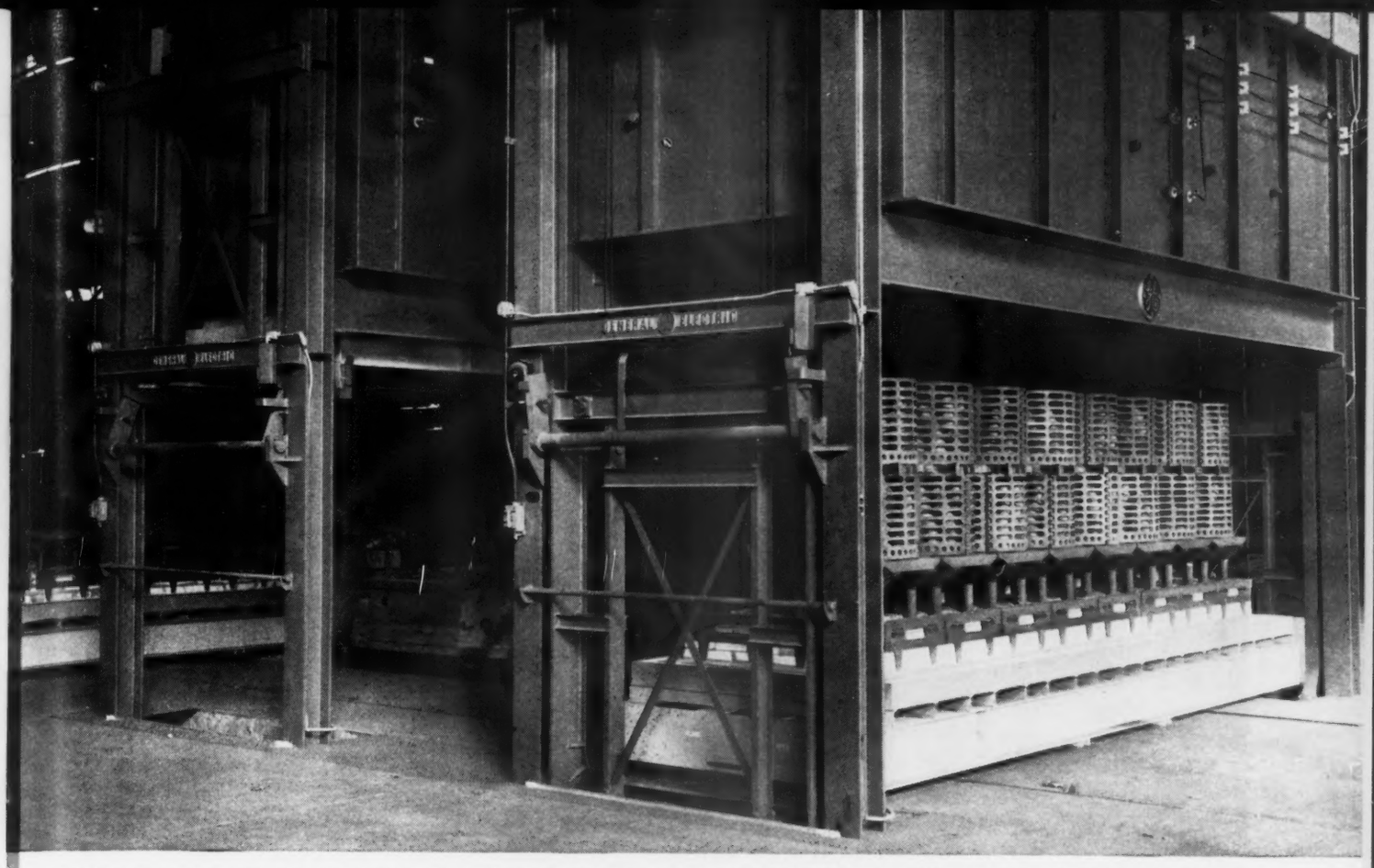
- **No. 11 NOISELESS TYPE VIBRATOR**
- **A-20 ELECTRIC VIBRATOR**
- **RED ELECTRIC KNEE SWITCHES**
- **"ROTO" ADJUSTABLE BIN VIBRATOR**
- **2 MIN. UNIVERSAL FINENESS TEST SIFTER.**
- **UNIVERSAL TRIPOD CARRIER**

ORDER ALL SIFTERS AND VIBRATORS WITH GROUND WIRE!!

FOUNDRY SUPPLIES MANUFACTURING CO., NOT INC.

2221 Orchard Street - Chicago 14, Illinois

Established 1918 **Cable Address: "Rotoplane Chicago"** **H. V. ADAMS, Mgr.**



COMPACT DESIGN OF THE G-E TWO-UNIT ANNEALING SYSTEM KEEPS FLOOR CLEAR FOR TRANSFER AND LOADING OPERATIONS.

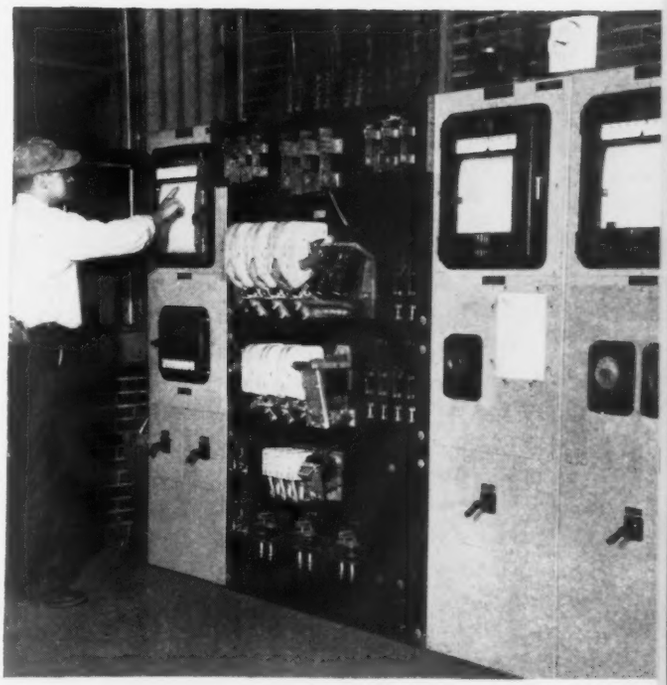
OHIO BRASS INSTALLS NEW SET OF G-E FURNACES TO ANNEAL MALLEABLE

Two-furnace Electric Annealing Is Fast, Accurate, and Uniform

The Ohio Brass Co., Mansfield, Ohio, has installed two G-E electric elevator furnaces to increase their output of high-quality malleable iron. One high-temperature and one low-temperature furnace, each with a capacity of 154 cu. ft., are built side by side. They require very little floor space and cars loaded with castings in light, open containers are quickly and easily moved from one section to the other. As you can also see from the above illustration, working conditions in this foundry are excellent.

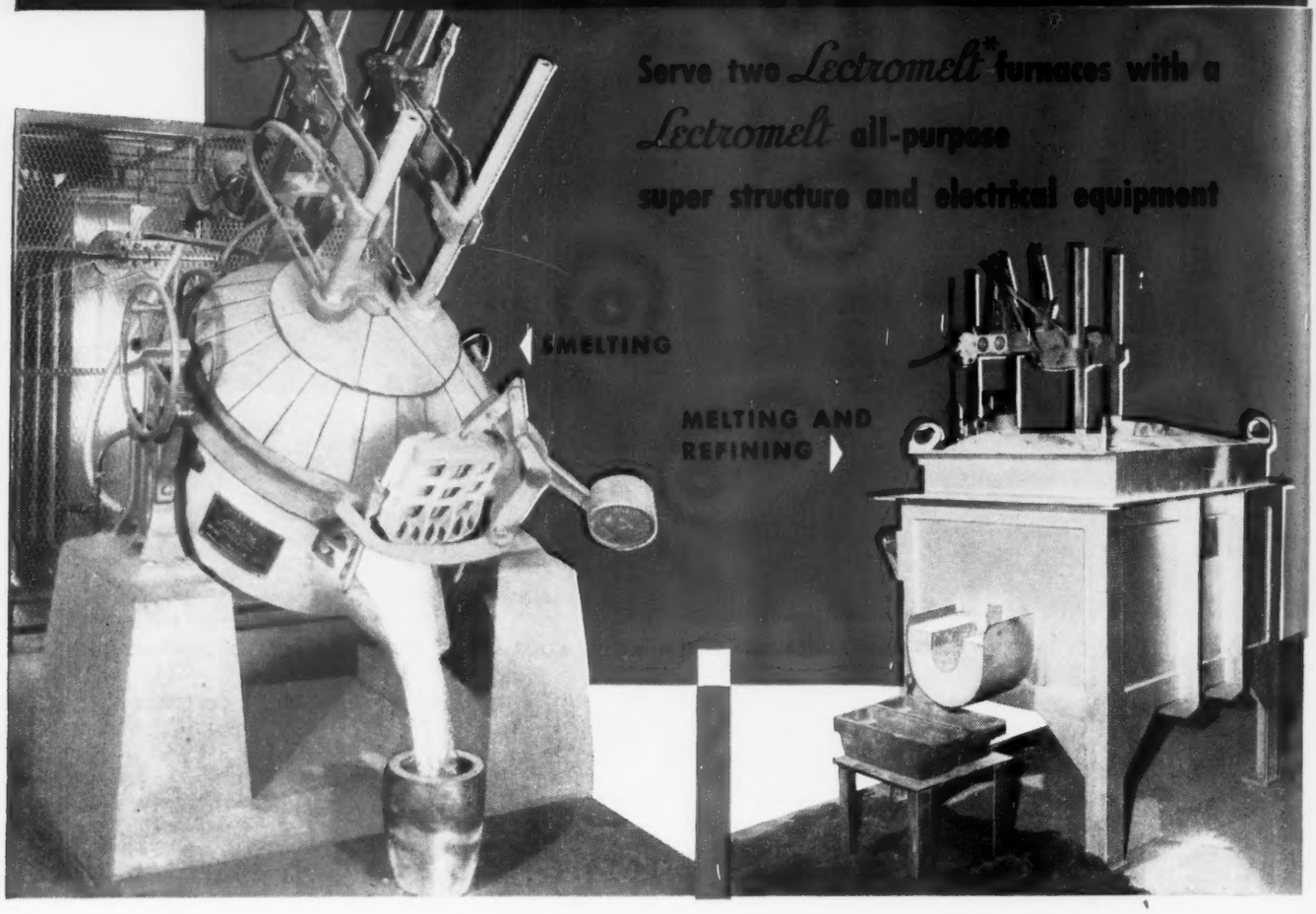
A COST STUDY on your plant by a G-E Heating Specialist may show you ways for greater long-range returns on your capital investment. His recommendations will be based on many other installations where G-E furnaces are helping malleable foundries to get lower over-all annealing costs, shorter time cycles, more uniformly annealed castings, a reduction in subsequent operations, and improved working conditions. Call the G-E Sales Office nearest you for the services of the G-E Heating Specialist. General Electric Co., Schenectady 5, N. Y. 720-92

GENERAL ELECTRIC



FROM THIS CONTROL PANEL, operator has close automatic control of heating and cooling rates in both units of the G-E furnaces.

Save money in outfitting your laboratory


Serve two Lectromelt* furnaces with a Lectromelt all-purpose super structure and electrical equipment
SMELTING
MELTING AND REFINING

With these two furnace shells and the one Lectromelt superstructure, your laboratory can handle almost any problem having to do with electric furnace operations. The superstructure can be shifted from one furnace to the other, as required, along with its electrical equipment.

The combination at the left is designed for small scale, batch smelting of ores and concentrates, melting of non-metallics, melting and refining of metallics. The furnace at the right can be used for continuous operations in experimenting on the reduction of ores and melting of non-metallics.

Both furnaces can be employed with direct and indirect arcs. 50 KVA of power is available on low voltages and 100 KVA on high voltages.

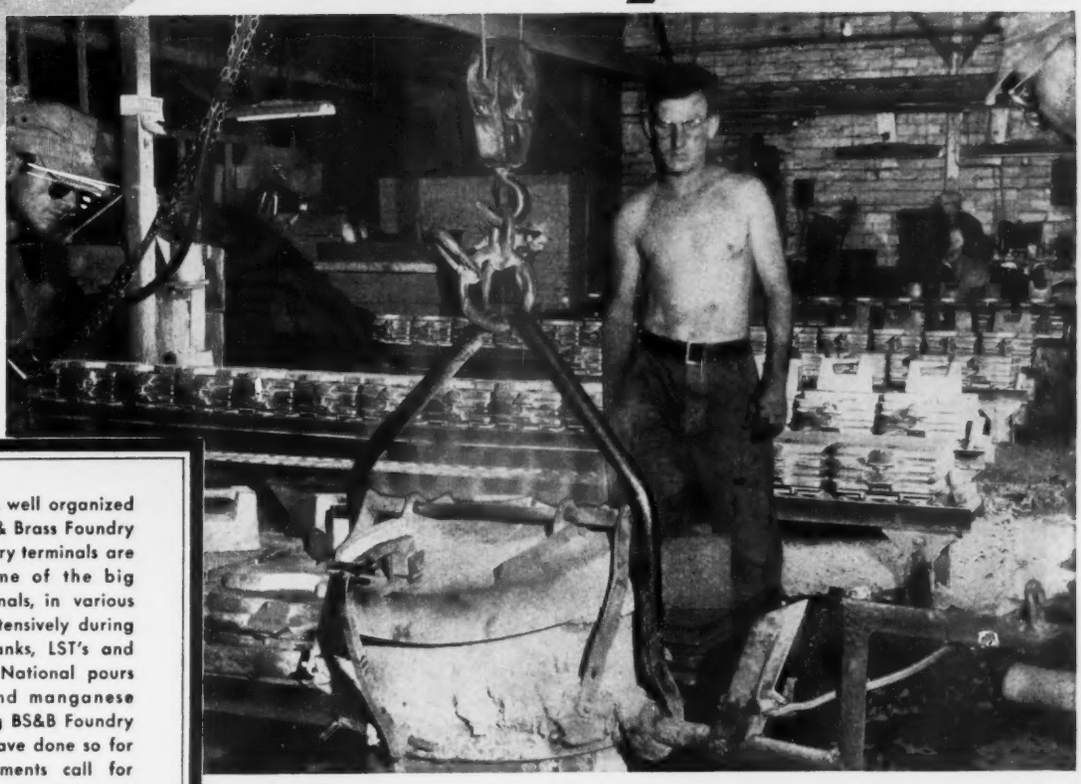
Lectromelt engineers have been conducting continuing research for many years on electrothermic reductions, so they can help you put these laboratory furnaces to work proving new processes or improving the old ones. For Catalog No. 104 telling you about this service, write Pittsburgh Lectromelt Furnace Corp., 314 32nd Street, Pittsburgh 30, Pa.

Manufactured in . . . CANADA: Lectromelt Furnaces of Canada, Ltd., Toronto 2 . . . ENGLAND: Birlec, Ltd., Birmingham . . . AUSTRALIA: Birlec, Ltd., Sydney . . . FRANCE: Stein et Roubaix, Paris . . . BELGIUM: S. A. Belge Stein et Roubaix, Bressoux-Liege . . . SPAIN: General Electrica Espanola, Bilbao . . . ITALY: Forni Stein, Genoa.

*REG. T. M. U. S. PAT. OFF.

WHEN YOU MELT... MOORE RAPID *Lectromelt*

BS&B Foundry Flasks



Here in the compact, well organized National Aluminum & Brass Foundry of Kansas City, battery terminals are turned out for some of the big names. These terminals, in various sizes, were used extensively during World War II on tanks, LST's and similar equipment. National pours brass, aluminum and manganese bronze. They're using BS&B Foundry Flasks exclusively...have done so for years. Their requirements call for various size flasks in the light and medium weight class.

"We just use 'em..and use 'em..and use 'em!"

SAYS: E. C. Austin . . . Vice President and General Manager

NATIONAL ALUMINUM & BRASS FOUNDRY

Maintenance? *"None to speak of", adds Mr. Austin*

He can point to BS&B Foundry Flasks they've been using for 20 years... maybe even 25. Mr. Austin not only knows his own foundry operation well but is extensively acquainted in the industry. He is past chairman of the Mo-Kan Chapter of the American Foundry Society and is currently on the board of directors of this chapter. He has had the opportunity to check the performance and service of many types and brands of flasks. It's little wonder he feels such a strong preference for BS&B Flasks.

The National Aluminum & Brass Foundry can well be proud of their line-up of regular customers . . . Ternstedt Division of General Motors, Packard Electric, Essex Wire, Cresent Cable Co., & Walker Bros.

Tailored to your operation . . .

BS&B Foundry Flasks are tailor made...designed for your particular need by foundrymen. They're fabricated by skilled workmen using quality materials. Constructed entirely of steel, the sections are surface ground . . . machined top and bottom for tight joint at parting line. Write for your FREE copy of the BS&B Foundry Flask Handbook. It's the useful foundryman's "bible".

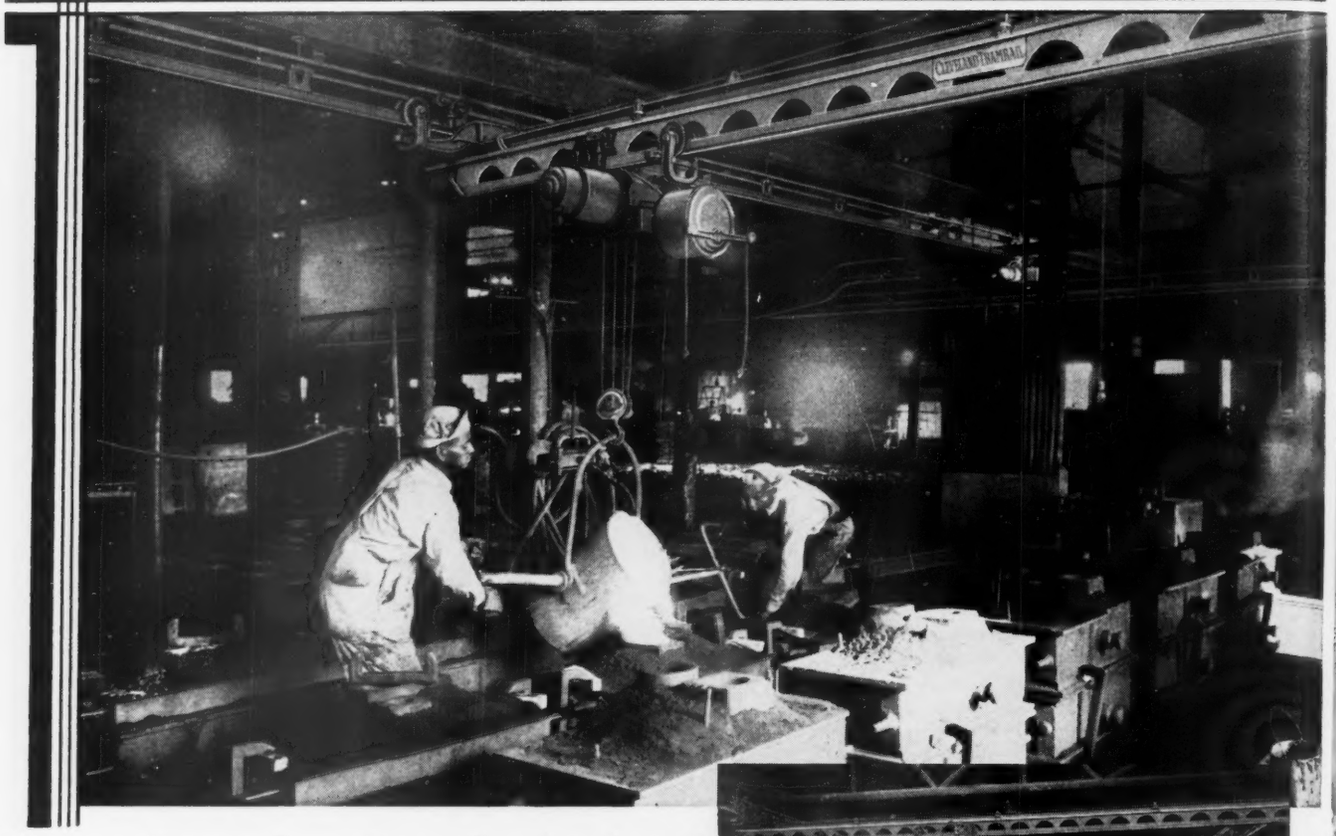
FOUNDRY OUR 60TH YEAR BS&B FLASKS

BLACK, SIVALLS & BRYSON, INC.

Foundry Flask Division Dept. 7-AR11

7500 East 12th Street Kansas City 3, Missouri

from LIGHT *to* HEAVY *Production Overnight*



Texas Foundry Revolutionized with CLEVELAND TRAMRAIL

Before the advent of Cleveland Tramrail the Trinity Valley Iron and Steel Company, a gray iron jobbing foundry in Ft. Worth, Texas, was limited to the production of small castings because their flasks, molds, cores and ladles could be no larger or heavier than readily handled by hand, except in the main bay of the shop.

Practically overnight this concern was revolutionized by installation of a Cleveland Tramrail system. It took them out of the small casting class; they now can pour castings of any size, from the smallest to the largest. It cut drastically the time required for handling materials and thereby boosted efficiency greatly. It reduced metal heat loss because conveying time from cupola to mold is less via the Tramrail route. Safety has been aided.

The Cleveland Tramrail system at Trinity Foundry consists of many bridges, hoist carriers, switches and extensive trackage which provides overhead handling service for nearly the entire floor area.

Trinity is now in such a favorable position that it is serving customers over a wide radius, some more than 1000 miles distant. It is doing so expeditiously, with better castings at lower cost.

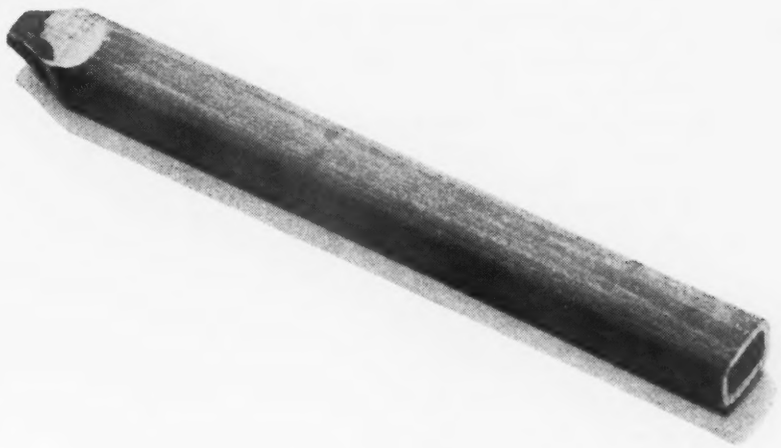
GET THIS BOOK!

BOOKLET No. 2008. Packed with valuable information. Profusely illustrated. Write for free copy

CLEVELAND TRAMRAIL DIVISION
THE CLEVELAND CRANE & ENGINEERING CO.
3816 East 286th St. WICKLIFFE, OHIO.

CLEVELAND TRAMRAIL
OVERHEAD MATERIALS HANDLING EQUIPMENT

Bill — you can get smoother cores with Mogul!



LARGEST SELLER IN THE FIELD!

Kordek, the preferred dry bond for cores . . .

• CUTS DRYING TIME • CUTS DOWN DISCARDS

Full technical service, without obligation, is available to show how you can profit from the use of MOGUL® Cereal Binder in your production.

Write Technical Sales Department

CORN PRODUCTS REFINING COMPANY • 17 BATTERY PLACE, N. Y. 4, N. Y.

43 Years of PROGRESS...

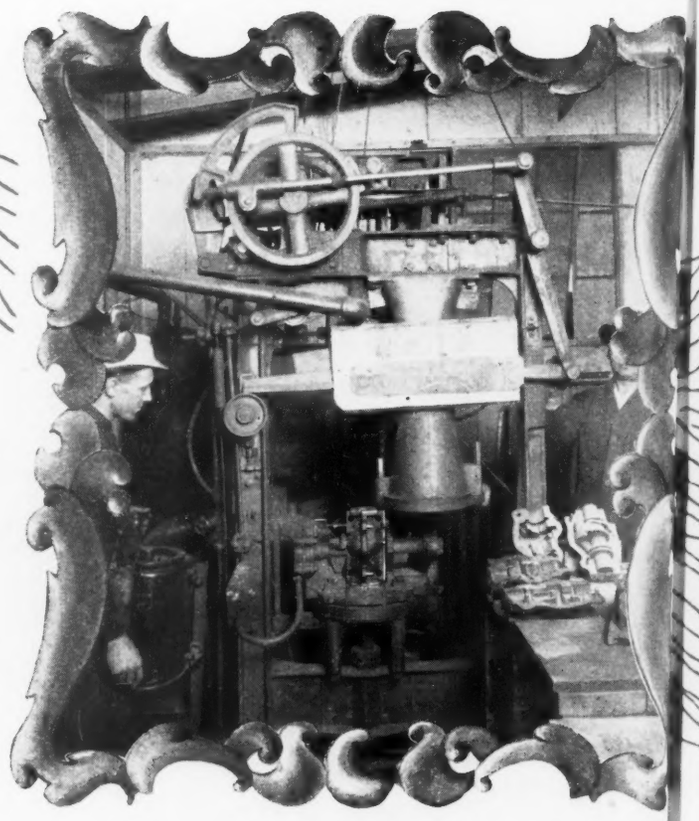
An Early Demmler Core Blower

The picture at the right, taken in 1909, shows one of the first Demmler core blowers. Some of these "old reliables" are still in use today — holding their own against modern core blowers. This machine had a line shaft driven carriage using compressed air for blow and clamp. In 1921, "old reliables" were discontinued in favor of the more modern all air operated machines.

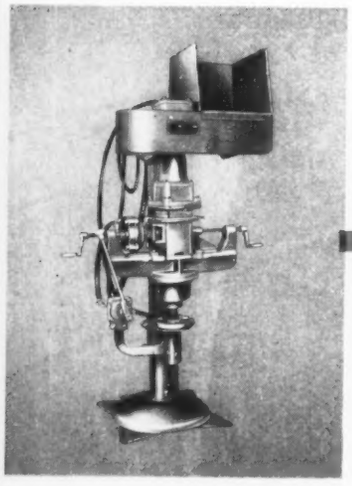
We think "old reliable" perfectly illustrates the famous Demmler quality, for only quality design and construction can make possible so many years of reliable service. Original pioneer of the core blower industry, Wm. Demmler & Bros. is still the acknowledged leader in the field.

Today, as in the "good ol' days", the name Demmler stands for quality and service. When you need information about core blowers, core boxes, vents, vented plates, etc., call on Demmler, the leader in the field. This service is yours without obligation.

DEMMLER CORE BLOWERS FOR 43 YEARS

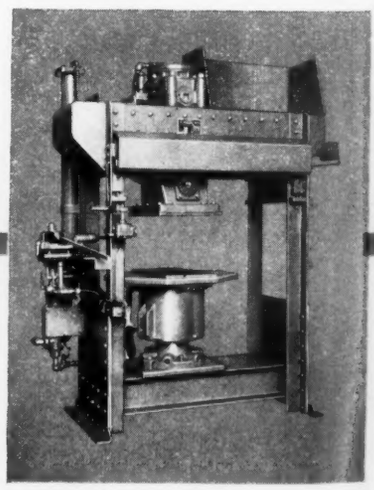


1909



MODEL NO. 55 — One hand valve operates both vertical and horizontal core box clamps. Capacity for cores up to 5 pounds. Fast economical production on short run jobs.

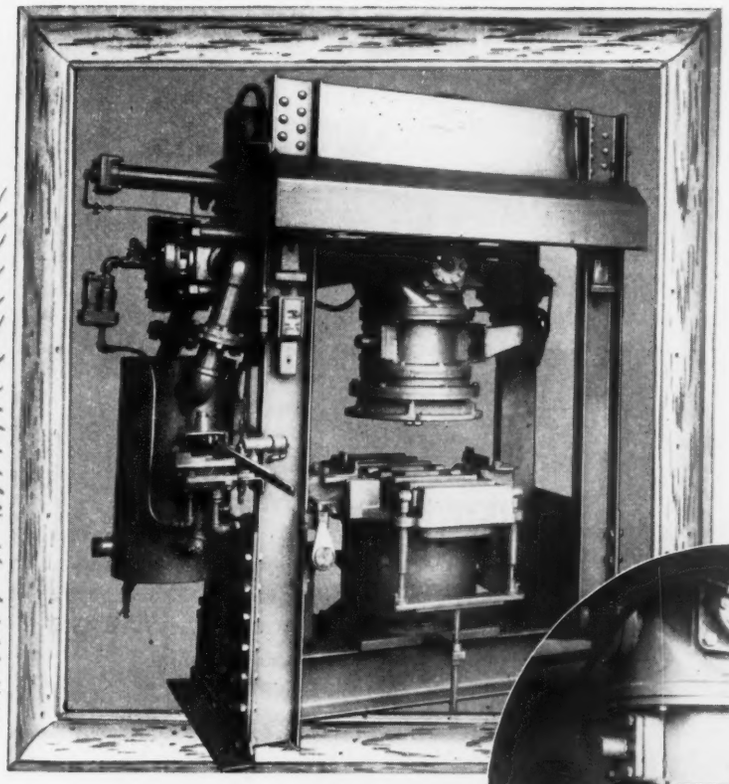
MODEL NO. 1E — Draw cylinder 11" diameter, 8" stroke. Throat opening in carriage 5" diameter. Blows cores up to 8 pounds. Designed for high production, low cost.



MODEL NO. 2E — Draw cylinder 14" diameter, 10" stroke. Throat opening in carriage 7" diameter. Capacity for cores up to 20 pounds weight. Each feature is a profit feature.

TO BRING YOU OUR

Latest Core Blower

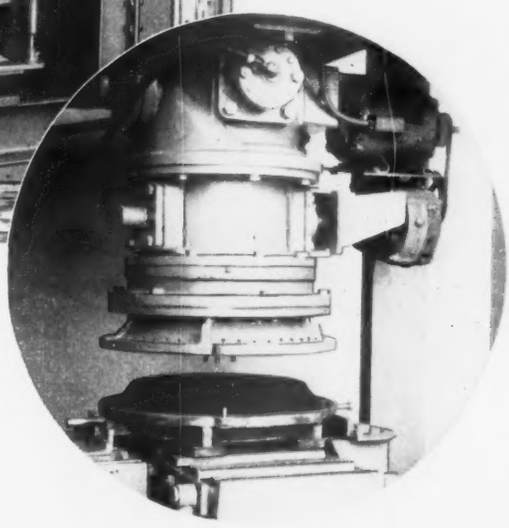


The LATEST Demmler Core Blower

We are proud to present the 103, our latest model combining all the valuable experience we have gained in 43 years of core blower manufacturing.

The 103 is a stationary magazine type core blower, capable of blowing ANY core or molding sand. It is fast, hard blowing and extremely efficient. All air-operated, the 103 is carefully designed to minimize maintenance.

This new blower is available in two sizes. The 103 handles cores up to 50 pounds. A larger model, called the 104, is designed to handle cores up to 250 pounds. Both models have either hand or automatic operation, six second maximum cycle. Absolutely the latest and best in core blowers.

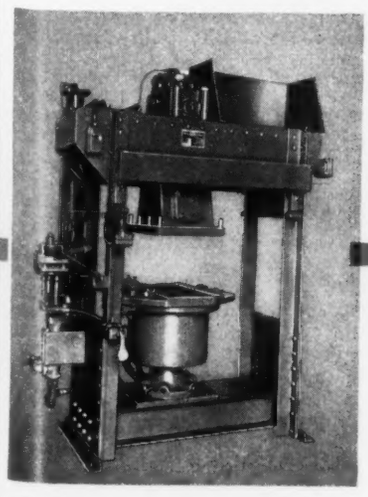


1952

Sand Agitator Available

A motor driven sand agitator is available as an accessory when blowing extremely heavy sands. Thoroughly tested, this agitator has been in use on Demmler Core Blowers for years.

The core shown on the table of the machine in the inset is blown of molding sand. This core blower is guaranteed to blow ANY molding sand or core sand required in the foundry!



MODEL NO. 3E — Draw cylinder 17" diameter, 10" stroke. Throat opening in carriage 10" diameter. For blowing cores up to 35 pounds in weight. Built with Demmler quality.

WM. DEMMLER & BROS.

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MINNEAPOLIS
Sept. 29, through Oct. 1.

MILWAUKEE
Oct. 7, through Oct. 10.

ST. LOUIS
Sept. 23, through Sept. 26.

BUFFALO
Oct. 29, through Oct. 31.

NEW HAVEN
Nov. 11, through Nov. 13.

BALTIMORE
Nov. 18, through Nov. 20.

NEWARK
Nov. 4, through Nov. 7.

CINCINNATI
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WINSTON-SALEM
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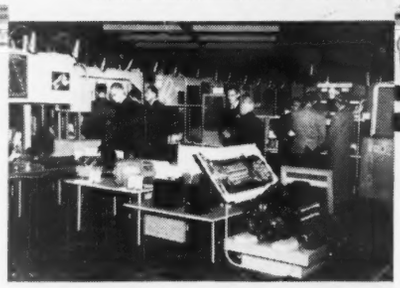
Coming to help you

solve problems in design and production!

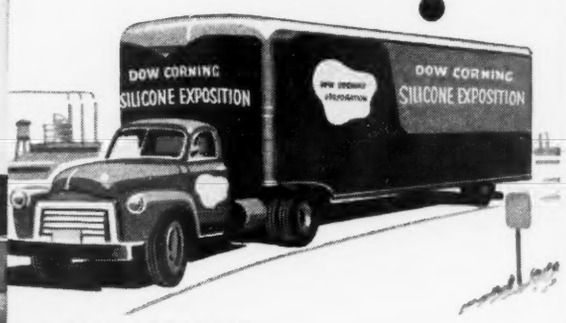
"BRINGING the mountain to Mohamet might best describe Dow Corning Corp.'s traveling exhibit . . . Free standing panels . . . separate the exhibit into nine bays, each emphasizing a property of silicones and showing where that property brings a benefit to an actual end product or operating unit . . ."
INDUSTRIAL MARKETING (June 1952)

"NEXT TO THE GREATEST SHOW ON EARTH . . . We could go on . . . reciting the fantastic properties of Silicones, but just as breathtaking as the materials were the display techniques used to demonstrate them . . ."
CIRCUIT RIDER (Vol. 6, No. 2, published by Electrical Construction and Maintenance)



". . . Heat Stability Plus: Visitors . . . see, among other demonstrations, how Silastic (Dow Corning's silicone rubber) remains soft and flexible at temperatures far above the limits of organic rubber . . ."
CHEMICAL WEEK (Jan. 26, 1952)

"IF YOU HAVEN'T already seen it, don't miss it when it comes around . . ."
POWER ENGINEERING (May 1952)



DOW CORNING SILICONES . . . are no longer a mystery or a "future possibility" to the 17,000 executives and engineers, representing more than 4600 plants, who have already seen the Dow Corning Silicone Exposition.*

They learned that silicones are fluids and resins that keep clothes and shoes and brick walls dry in the rain. They're fluids that polish without rubbing.

They're rubber that won't melt on hot aircraft engine cylinders or freeze on switches that operate bomb bay doors at 100° below zero.

They're electrical insulating resins and varnishes that double the power of electric motors, or multiply by 10 the life of electric machines.

They're paints that protect metal at 1000°F. They're foam killers and release agents. They're a whole family of new engineering materials that can help you to improve your product or to cut production costs.

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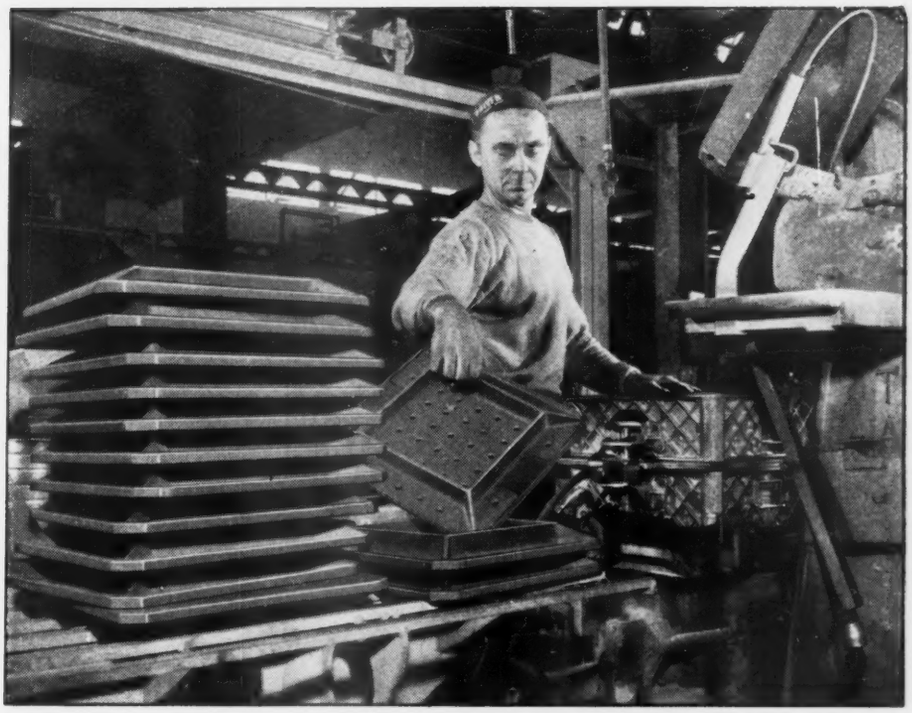
ENGLAND: Midland Silicones Ltd., 49 Park Lane, London, W 1

"Burning and Breakage loss not a factor since using EDCO Dowmetal BOTTOM BOARDS"

...says Olney Foundry, LINK-BELT COMPANY, Philadelphia, Pa.



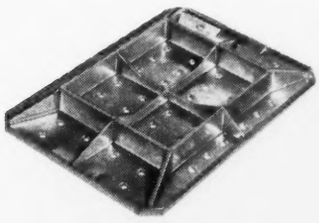
Modern mechanized foundries, like Olney Foundry, rely on the durability of EDCO DOWMETAL Bottom Boards. Even after 3 years of constant use, the EDCO DOWMETAL Bottom Boards at Olney Foundry continue to give maximum production efficiency. That's why Olney Foundry says with confidence: "Burning and breakage loss not a factor since using EDCO DOWMETAL Bottom Boards".

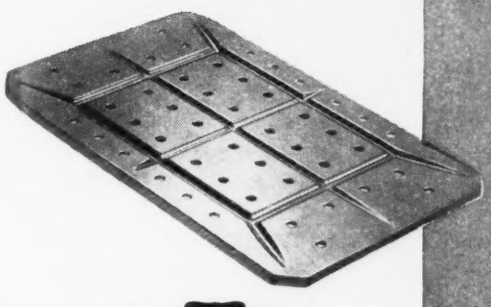
EDCO DOWMETAL Bottom Boards also help produce castings that are true to pattern. The exclusive grooved and vented design permits escape of gasses, and insures mold stability. Causes for rejects are kept to a minimum.

"EDCO DOWMETAL Bottom Boards are now permanent equipment in our foundry", adds Olney Foundry. "They help increase output while cutting production costs, and have more than paid for themselves in savings alone effected by substantially reduced replacement costs."

Regardless of the size of your foundry operation, your molders will like handling these boards because they are strong—yet light in weight, easy to stack, and do not splinter. EDCO DOWMETAL Bottom Boards will not warp or rot—there are no nails to come out, nothing to break or split—no upkeep.

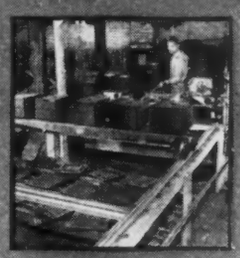
Write us, or phone CApitol 7-2060 for price schedule and list of 74 standard sizes available from stock.

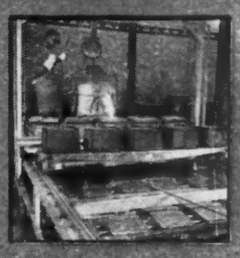




Olney Foundry was established in 1920 as a division of Link-Belt Company in Philadelphia, Pa. Olney Foundry produces gray iron castings of every description ranging in size from a few ounces to ten tons in weight. EDCO DOWMETAL Bottom Boards have been extremely helpful in maintaining the high degree of modern mechanization characteristic of Olney Foundry.

The illustrations at right show some of the foundry production equipment used by Olney Foundry to achieve their high degree of modern mechanization. The pallet-type gravity conveyor in the top panel shows molds on EDCO DOWMETAL Bottom Boards being moved to the pouring area. This pouring area is shown in the lower panel. The molds are automatically dumped after pouring and the EDCO DOWMETAL Bottom Boards are returned by the conveyor to the molder.





EDCO CHRISTIANSEN CORPORATION

CHRISTIANSEN CORPORATION

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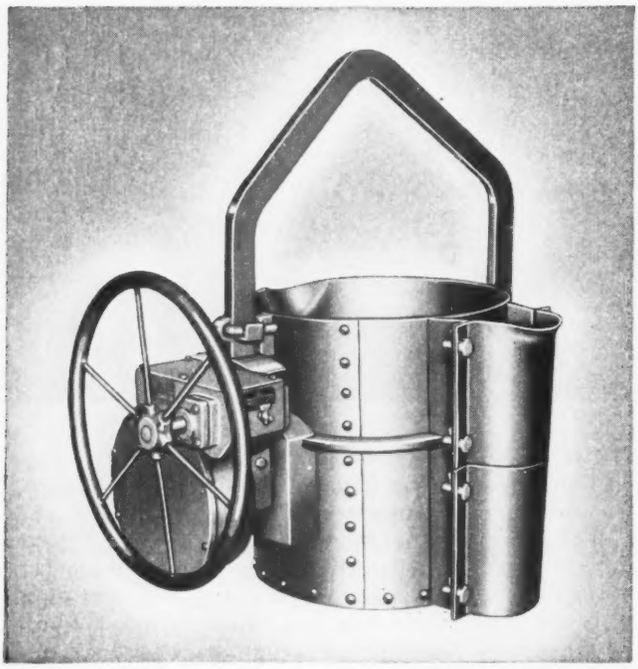
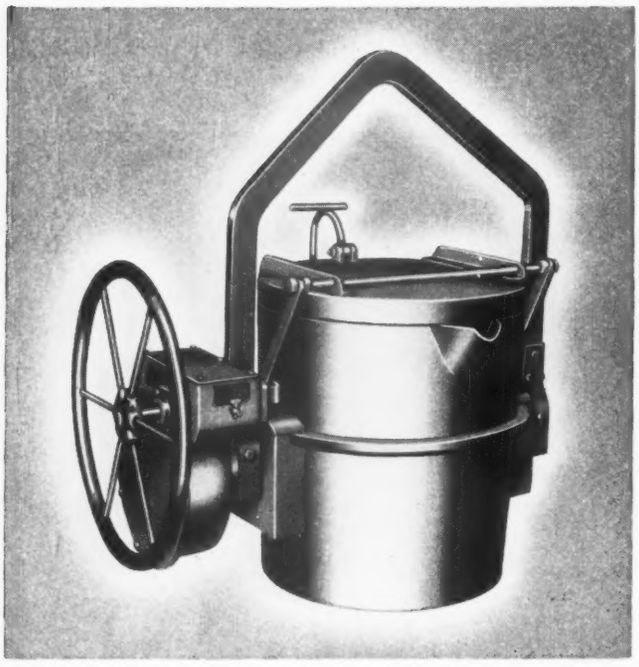
Ladle Headquarters





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BOWLS

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Industrial Equipment has all the ladles: teapot spout . . . covered . . . cylindrical . . . reservoir . . . buggy . . . bottom discharge . . . and many others, standard and special.

Each represents the last word in proven design and operating efficiency. All Industrial Crane Ladles are available with Industrial's revolutionary new universal bail which completely eliminates binding from heat or misalignment.

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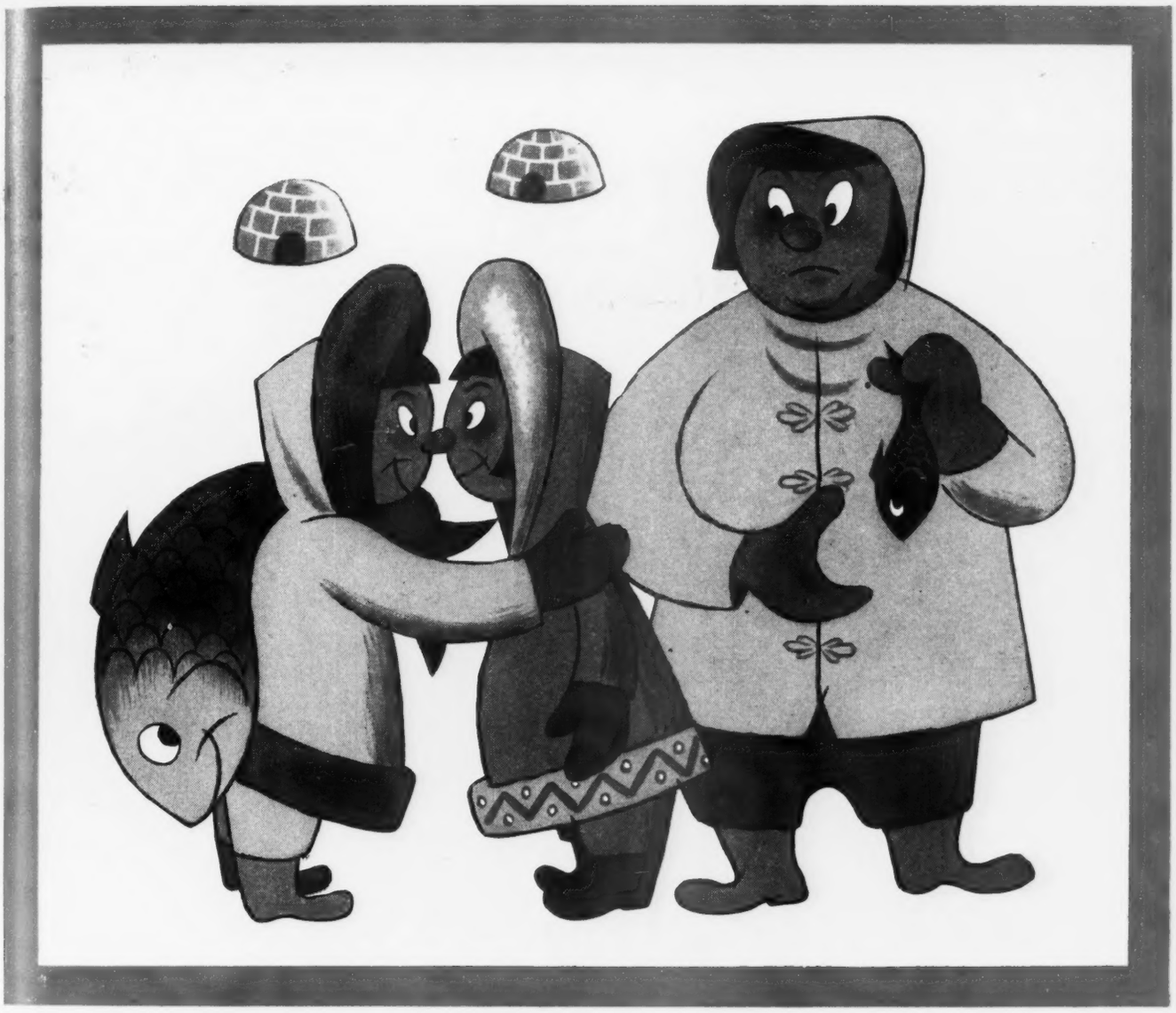


FOR SURE RESULTS IN MAKING A CASTING, USE

PENOLYN CORE OIL

For Maximum Foundry Efficiency . . . be sure to specify Penolyn Core Oil. There is a grade of Penolyn for Every Type of casting, to meet the most exacting requirements of every conceivable Foundry and Core Room Practice.

Penolyn Core Oil offers these 10 Important Features for full efficiency—

- Uniformity
- Concentrated form
- No obnoxious odor
- No seepage
- No crusting of green mix
- Clean working
- Wide temperature baking range
- Polymerized formulation
- Minimum gas
- Ample collapsibility

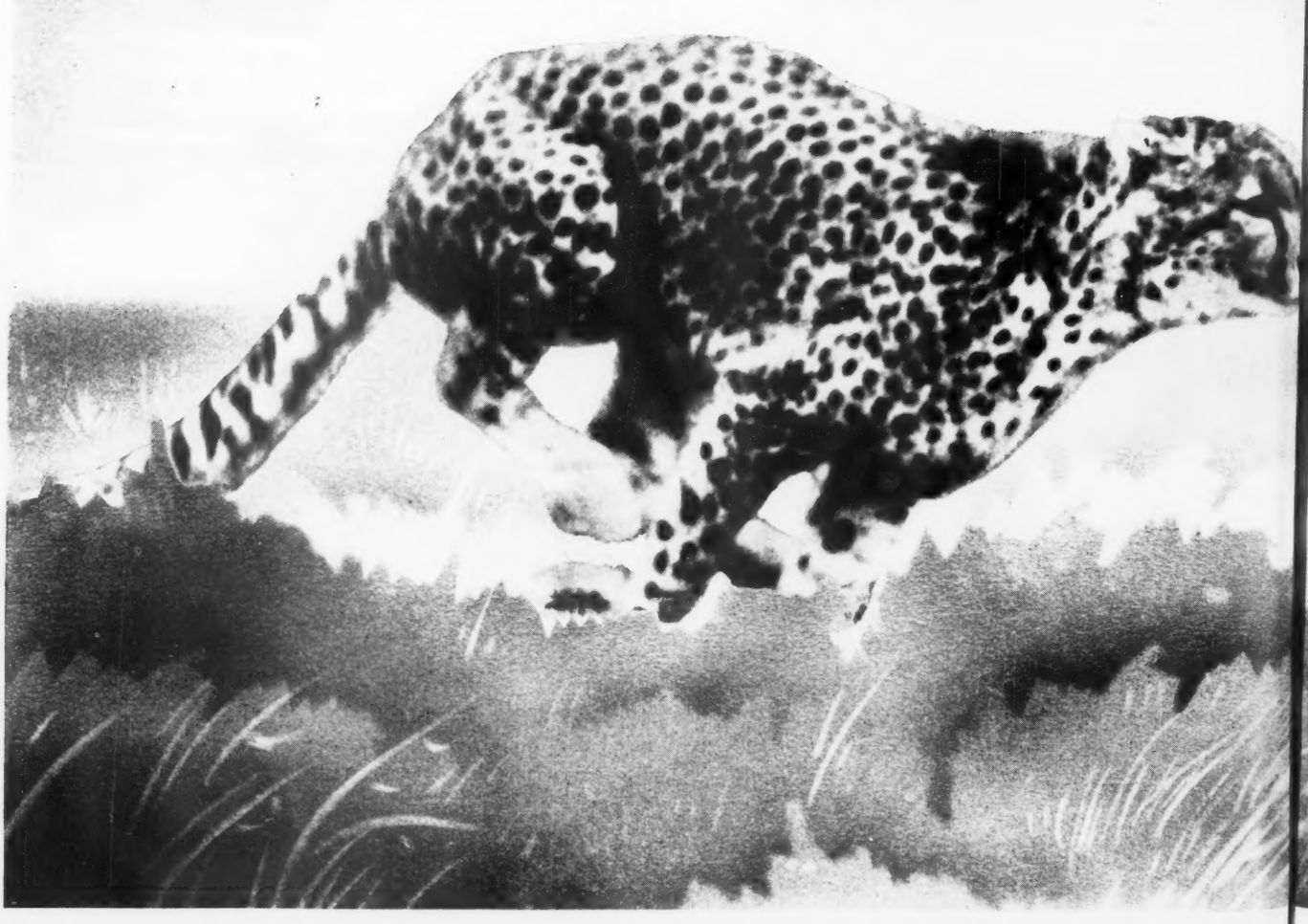
PENOLA OIL COMPANY

NEW YORK • DETROIT • CHICAGO • ST. LOUIS

Penola

FOR EXPERT TECHNICAL ASSISTANCE — be sure to call the nearest Penola Office for any technical data or assistance you may need regarding your casting operations.

The cheetah has been employed for centuries, in India and Persia, for hunting antelope and other game. It is handled like a falcon—leashed, hooded and kept blindfolded until the game is in sight, when it is loosed. With a great bound, it darts after the quarry, which it quickly overtakes, drags down and holds until the huntsman comes.



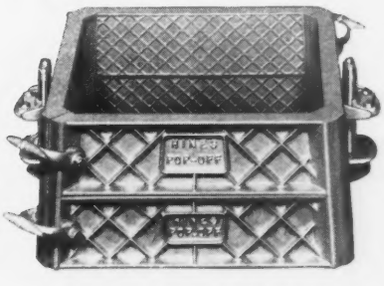
SPEED

The cheetah, or hunting leopard, is the fastest animal in the world. Its long, slender limbs give it an amazing *speed* over short distances—reportedly as high as seventy miles per hour.

There are many ways in which to compare foundry flasks for *speed*, but the one sure way is to compare them by the results obtained. That is, from a given number of molds produced, how many good castings are obtained? That's the true test of the speed you get from any flask, and in that respect, particularly, HINES FLASKS are really outstanding. Production reports from leading foundries everywhere show that HINES FLASKS produce an unusually high percentage of good molds and, conversely, less scrap.

So, if it's *speed* you're after in your foundry, check up on the flasks you're using. If they aren't HINES FLASKS, you're wasting time—and money.

HINES FLASKS



HINES POP-OFF FLASK

THE HINES FLASK CO.

3431 WEST 140TH STREET, CLEVELAND 11, OHIO · TELEPHONE: ORCHARD 1-2806

NEW Cedarapids Built by IOWA Schrock Motorized HEAD PULLEYS

SIMPLIFY EVERY BELT CONVEYOR AND BELT-BUCKET ELEVATOR INSTALLATION

IT'S COMPLETELY DIFFERENT FROM CONVENTIONAL CONVEYOR DRIVES

Everything is contained **INSIDE** the pulley!

ELIMINATES ALL MAINTENANCE ON SPROCKETS, CHAINS, JACK-SHAFTS, V-BELTS, ETC.

U.S. Pat. No. 3548399 Others Pending

WHAT A *Motorized* HEAD PULLEY IS

THIS is a revolutionary departure from the conventional types of conveyor drives. A *motorized* head pulley is a fabricated steel pulley with *everything*... electric motor, reduction gears and all moving parts . . . contained inside the drum! It's simply a new application of the long-proven gear reduction drive, and because of its simplicity, it's the answer to the maintenance man's prayer. 70% to 90% of conveyor down time is saved by eliminating all countershafts, speed reducers, sprockets, chains, Universal shaft drive and other parts necessary with conventional pulley drives. Motorized Head Pulleys are simple to install and flexible in use, completely interchangeable and adaptable to all types of belt and belt-bucket conveyor installations. By means of a simple adapter, a single pulley can be utilized in any of several belt locations, operating various widths of belt, or changing from larger or smaller horsepower. Pulley sizes range from 5 to 30 HP and are available in various widths. A Motorized Head Pulley is safe, because there are no sprockets, chains, jack-shafts, V-belts, etc. to endanger personnel. It's compact... requires no more room than a conventional pulley. Complete protection from weather, grit and dirt also reduces maintenance. Cedarapids Schrock Motorized Head Pulleys have been job-tested for many years under severest working conditions.

HOW IT WORKS

The pulley shell rotates about the electric motor, which is held stationary by means of a torque arm attached to the conveyor frame. The speed of the shell depends upon the combined reduction ratio of the various pinions and gears contained within the pulley shell. This reduction starts with a primary pinion mounted on the motor shaft and ends in the ring gear attached to the shell. The shell in turn then drives the conveyor belt. Leads to the motor enter the head pulley through a hollow conduit passing through the drum end bell and bearing. A simple oil bath gear compartment provides a lubricating bath for the reduction gears and front motor bearing. Motor and head pulley are cooled and ventilated by holes in the drum.

GET COMPLETE DETAILS TODAY

Find out all the advantages of converting your conveyor installations to motorized efficiency before you need head pulley replacements. One internationally known company has 50 Motorized Head Pulleys installed on widespread conveyor operations, and plans more for every installation that requires replacement. Get complete details about every feature. See your distributor today, or write direct to Iowa Manufacturing Company.

IOWA MANUFACTURING CO.
Cedar Rapids, Iowa, U.S.A.

Built for sale in Arizona, California, Idaho, Montana, Nevada, New Mexico, Oregon, Texas, Utah and Washington.

YUBA MANUFACTURING CO.
Pulley & Sprocket Dept., Benicia, California

OREFRACTION

ZIRCON

SAND

AND

FLOUR

- DOMESTIC & AUSTRALIAN ZIRCON FOUNDRY SANDS
- ZIRCON FOUNDRY FLOURS IN 200 AND 400 MESH PARTICLE SIZES

Orefraction Inc., a large and leading American

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KUX

FIRST NAME IN DIE CASTING MACHINES

MODEL **HP-20**
Hydraulically operated die casting machine for production of aluminum castings.

USED BY

NATIONAL REJECTORS, INC.

FIRST NAME IN COIN CONTROL DEVICES

The desire for a soft drink or a candy bar, . . . a vending machine and a coin. They're the ingredients it takes to make "magic with a nickel!" Right before your eyes, a miracle of miracles takes place. The proper change is returned plus the refreshment . . . all due to a remarkable behind-the-scenes mechanism made by NATIONAL REJECTORS, INC.

Using KUX die casting machines, NATIONAL REJECTORS, INC. turns out thousands upon thousands of intricate, extremely sensitive coin control devices that automatically check the coin for authenticity, return the exact change . . . and please your appetite!

Does YOUR PRODUCT require pin-point accuracy? Quality die castings often provide the difference between success and failure . . . profits and losses. KUX, first name in die casting machines, can make that difference for YOU!

Write for illustrated catalog showing complete line of KUX Die Casting Machines.

KUX MACHINE COMPANY
6725 N. RIDGE • CHICAGO 26, ILLINOIS

KUX

FIRST NAME IN DIE CASTING MACHINES
SELECTED BY FIRST NAMES IN INDUSTRY

Cut Baking Time 50%

BREAK THAT "BAKING BOTTLENECK" WITH TRULINE® BINDER

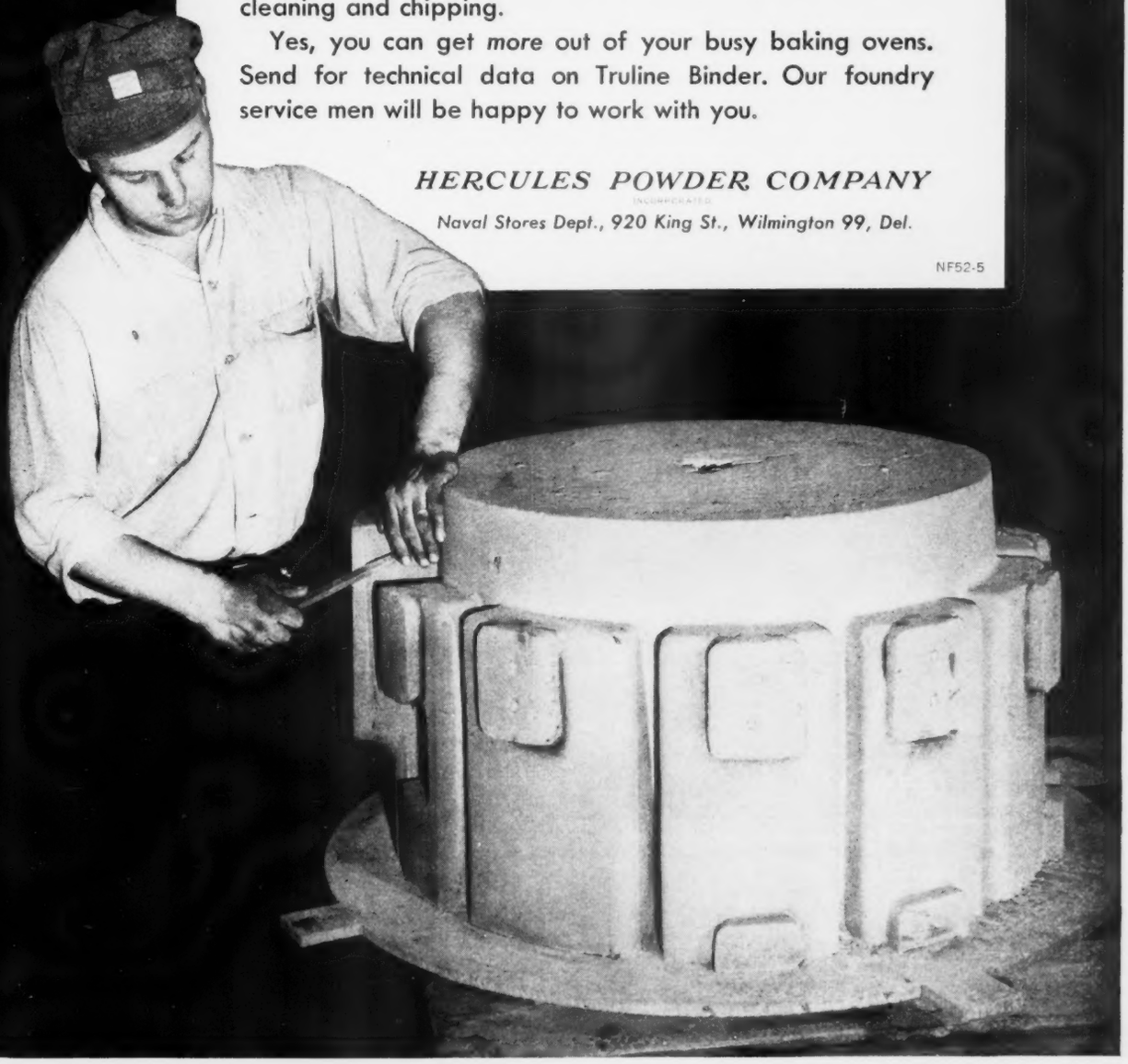
This large core, made with Truline Binder, baked *thoroughly* in one night at 400°F—half the time it took when other binders were used. Even larger cores than the one shown here have been baked overnight.

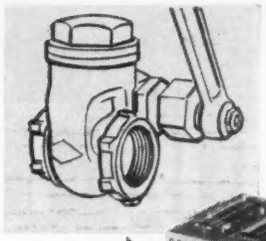
Many iron foundries have solved their slow baking problem by using Truline. Actually, this better binder allows *one* core oven to do the work of two. Other economy advantages with Truline include big cuts in new sand and binder costs; cleaner, smoother castings; and man hours saved in cleaning and chipping.

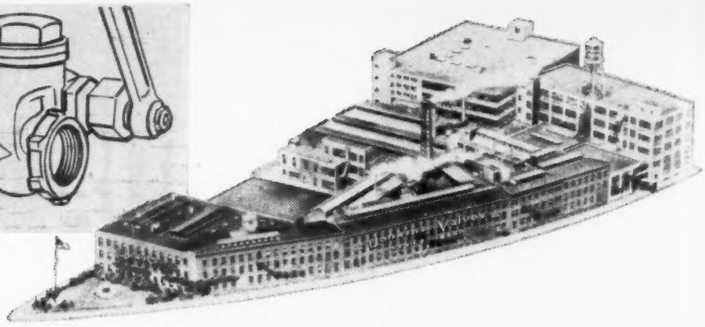
Yes, you can get *more* out of your busy baking ovens. Send for technical data on Truline Binder. Our foundry service men will be happy to work with you.

HERCULES POWDER COMPANY
INCORPORATED
Naval Stores Dept., 920 King St., Wilmington 99, Del.

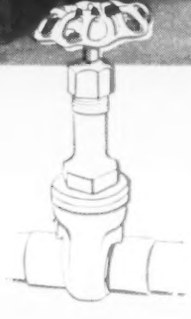
NF52-5





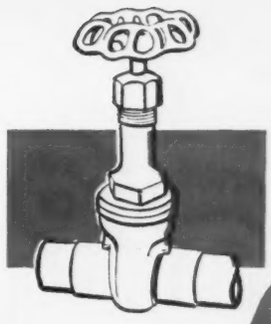


Quality starts

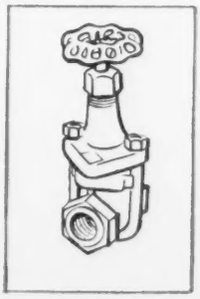


ROCKING action does it...better

Jenkins Bros. uses nine Detroit ROCKING Electric Furnaces to melt bronze for valves



in the furnace!



Top grade valves require top quality castings. And top quality castings require metal that is precisely right.

Jenkins Bros., makers of fine valves for almost a century, have 9 Detroit Rocking Electric Furnaces, with a combined capacity of 7700 lbs. per hour, to melt bronze of the necessary high quality.

PRECISE CONTROL OF ANALYSIS

Melt-analysis can be controlled very exactly in these great furnaces, with metal of the desired characteristics produced in heat after heat. Accurate temperature control allows establishment of the most advantageous pattern for operation, and duplication of that pattern for each melting cycle. The rocking action of the furnaces assures homogeneous melts and a more complete utilization of generated heat because of the flow of molten metal back and forth on the lining.

NOTE THESE ADVANTAGES

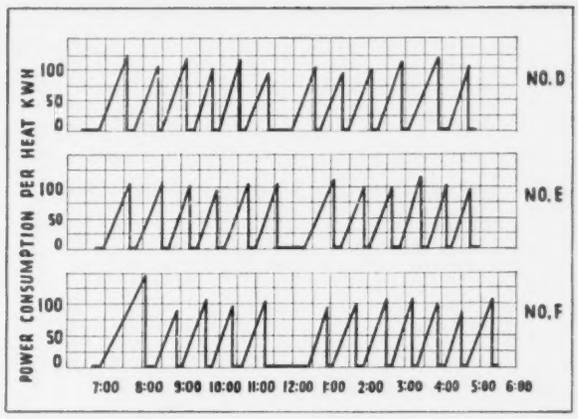
Other important advantages of Detroit Rocking Electric Furnaces are economy of power consumption, minimum heat loss, less metal shrinkage, fewer scrap castings, more heats per shift or working day, reduced out-of-production time because of long refractory wear and simple shell replacement, trouble-free operation.

Detroit Electric Furnaces range from 10 lbs. to 4000 lbs. capacity, individually designed to fit your plant's electrical specifications. They melt ferrous and non-ferrous metals with equal efficiency.

GET FULL INFORMATION

For full information on the advantages of Detroit Electric Furnaces for your foundry, send us your operating data. We'll give you full details. Write today.

OPERATING RECORDS OF 3 JENKINS BROS. FURNACES



Each furnace melted 4½ tons of bronze in 10½ hours. KWH consumption respectively, 1312, 1272, 1269.

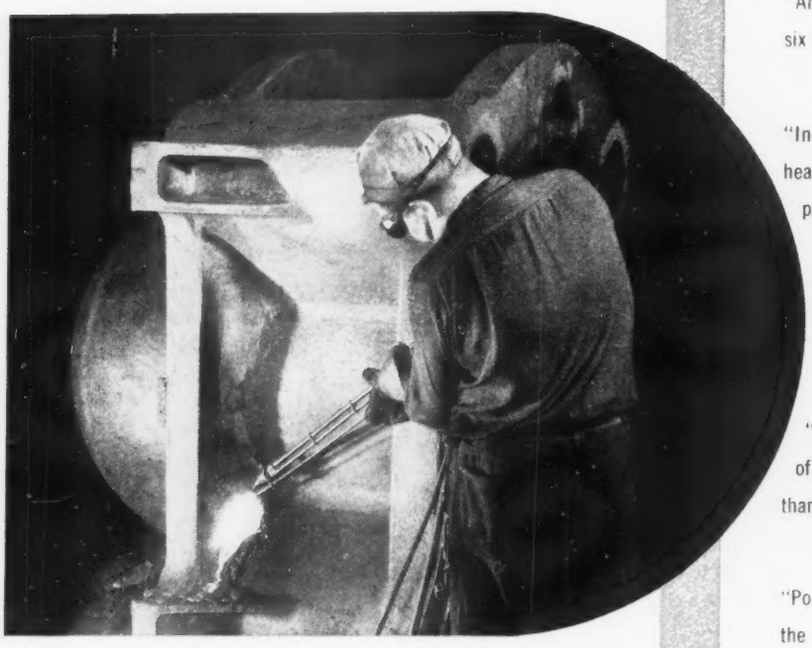
DETROIT ELECTRIC FURNACE DIVISION
KUHLMAN ELECTRIC COMPANY, BAY CITY, MICHIGAN

Foreign Representatives: in BRAZIL—Equipamentos Industrias, "Eisa" Ltd., Sao Paulo; CHILE, ARGENTINA, PERU and VENEZUELA: M. Castellvi Inc., 150 Broadway, New York 7, N. Y.; MEXICO: Cia Proveedora de Industrias, Atenas 32-13, Apartado 27A3, Mexico 6, D. F., Mexico; EUROPE, ENGLAND: Birlec, Ltd., Birmingham.

melts, faster melts

POWDER-WASHING SPEEDS CLEAN-UP

Removes excess and defective metal quickly, easily, and at low cost



Cleaning-floor bottlenecks eliminated, production up, costs down, scraps and recasts negligible—that's the gist of enthusiastic reports on LINDE's powder-washing process.

Powder-washing combines the quiet speed of oxygen-cutting with a surface quality comparable to finish grinding. It removes fins, pads, sand inclusions, penetrations, burned core sand, chill bars, nails, chaplets, cracks and tears. It finishes flat or uneven surfaces to close tolerances with equal ease. And the powder-washing flame gets into places where other equipment can't.

Powder-washing can be applied to any carbon or alloy-steel casting. Equipment is simple. Technique is easily mastered in a short time.

For further details, telephone or write today. LINDE AIR PRODUCTS COMPANY, a Division of Union Carbide and Carbon Corporation, 30 East 42nd Street, New York 17, N. Y. In Canada: Dominion Oxygen Company, Limited, Toronto.

WHAT DO FOUNDRYMEN SAY ABOUT POWDER-WASHING?

"... powder-washing does for us in two hours what required one day of chipping."

*

"An hour of powder-washing has replaced four to six hours of grinding."

*

"Increased production and reduced labor and overhead more than make up for the cost of gases and powder consumed."

*

"... the equivalent of four days' chipping in one and one-half hours."

*

"... a casting which formerly required one hour of grinding is cleaned by powder-washing in less than five minutes."

*

"Powder-washing cleaned one casting in an hour, the other in 30 minutes. Conditioning by chipping and grinding would have taken three and two days respectively."

*

"... removed the shifted cores and penetrations with a saving of several hundred man hours."

*

"... in a few hours, cleaned up housings that otherwise would have had to be scrapped."

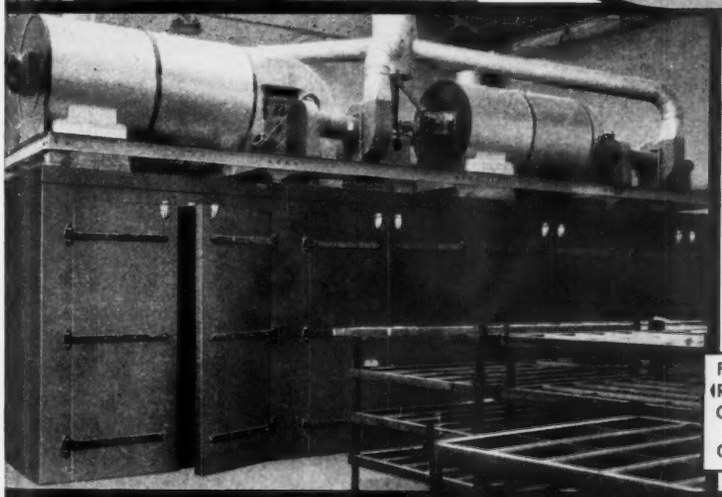
*

"... washed out a layer of sand from inside the cylinder in less than two hours, a job we could have done with no other available equipment."

LOOK TO *Linde* trade-Mark know-how . . . show-how . . . products and processes FOR WELDING, CUTTING, TREATING, FORMING METALS

The term "Linde" is a registered trade-mark of Union Carbide and Carbon Corporation.

Two Compartment Car Type Mold Drying Oven.
Two Compartment Rack Type Core Oven.
Single Compartment Rack Type Core Oven.
LANLY
FOUNDRY OVENS
THE LANLY COMPANY • 780 PROSPECT AVE
CLEVELAND, OHIO



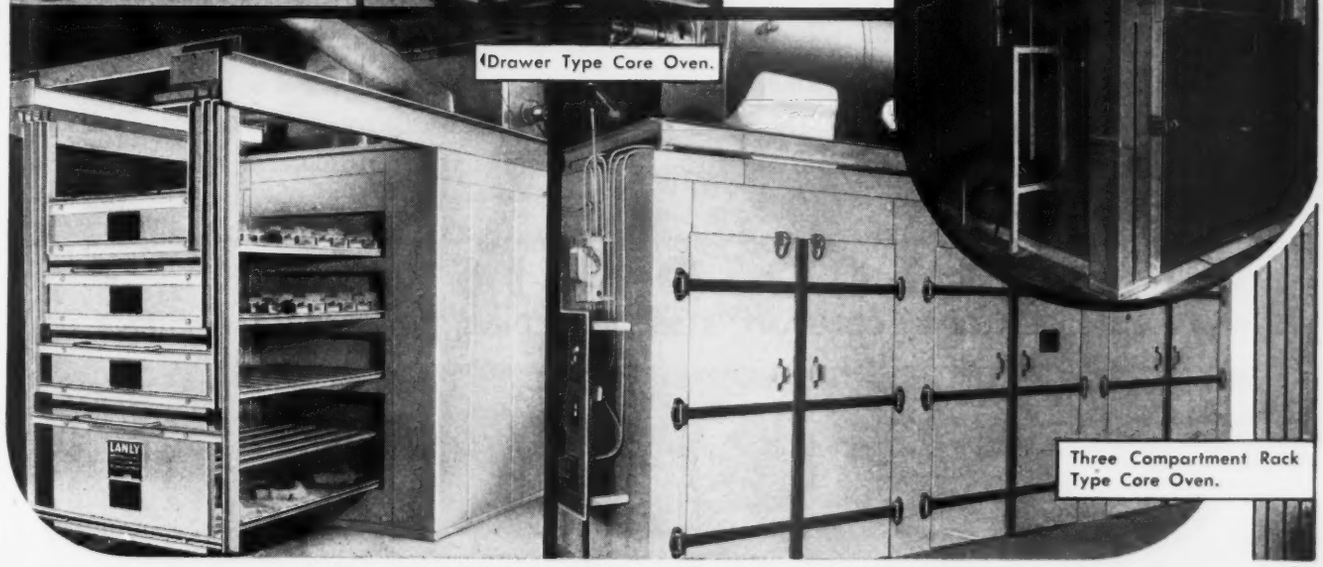
The Lanly reputation has been established as the result of the consistent incorporation of advanced, efficient design and high grade construction into every Lanly installation.

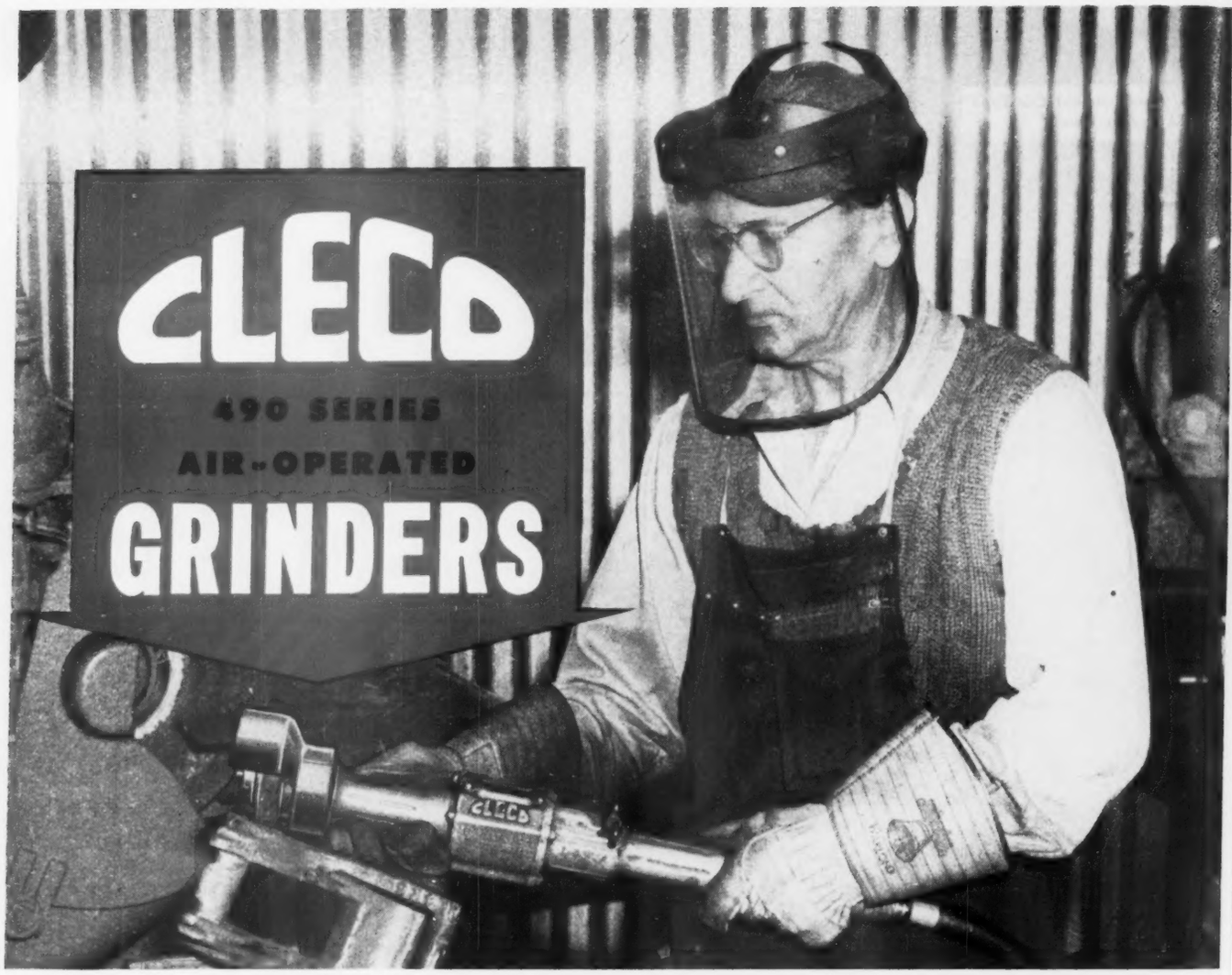
Core baking, pasting and mold drying ovens as well as casting conditioning and heat-treating ovens are available in standard units.

Write for Literature and Complete Information.

Four Compartment Rack Type Core Oven.

Car Type Core Oven.





Fast grinder for Mn.-Mo. steel castings

Cleco 490 Series Grinders do a fast, economical job of cleaning up hard castings like these of manganese-molybdenum alloy steel. They cut fast—reducing cleanup time—and they stay on the job with a minimum of maintenance.

Don't waste time and money trying to use the wrong grinder when you can cut costs and increase output just by selecting the right tool.

Go over your grinding problems with a Cleco Field Engineer. Let him help you select the right grinder for each application. Ask him to suggest ways to get the most out of each tool. You will be surprised at the savings you can make.

CLECO AIR TOOLS

DALLETT PNEUMATIC ACCESSORIES

CLECO DIVISION

of the REED ROLLER BIT COMPANY, 5125 Clinton Drive, Houston 20, Texas, U.S.A.

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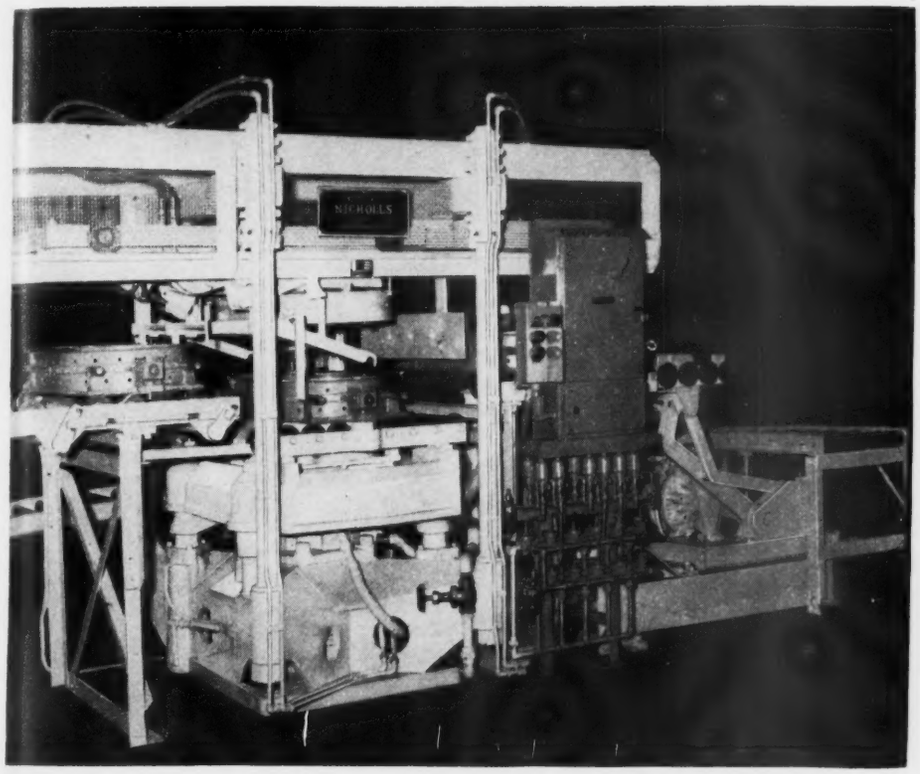


No. 21 Type C. F.—Jolt, Squeeze and Pattern Draw — Automatic-Push Button Control

(Also Made in Smaller and Larger Sizes)

New "Push-Button" Operation Takes The Guesswork Out of Molding

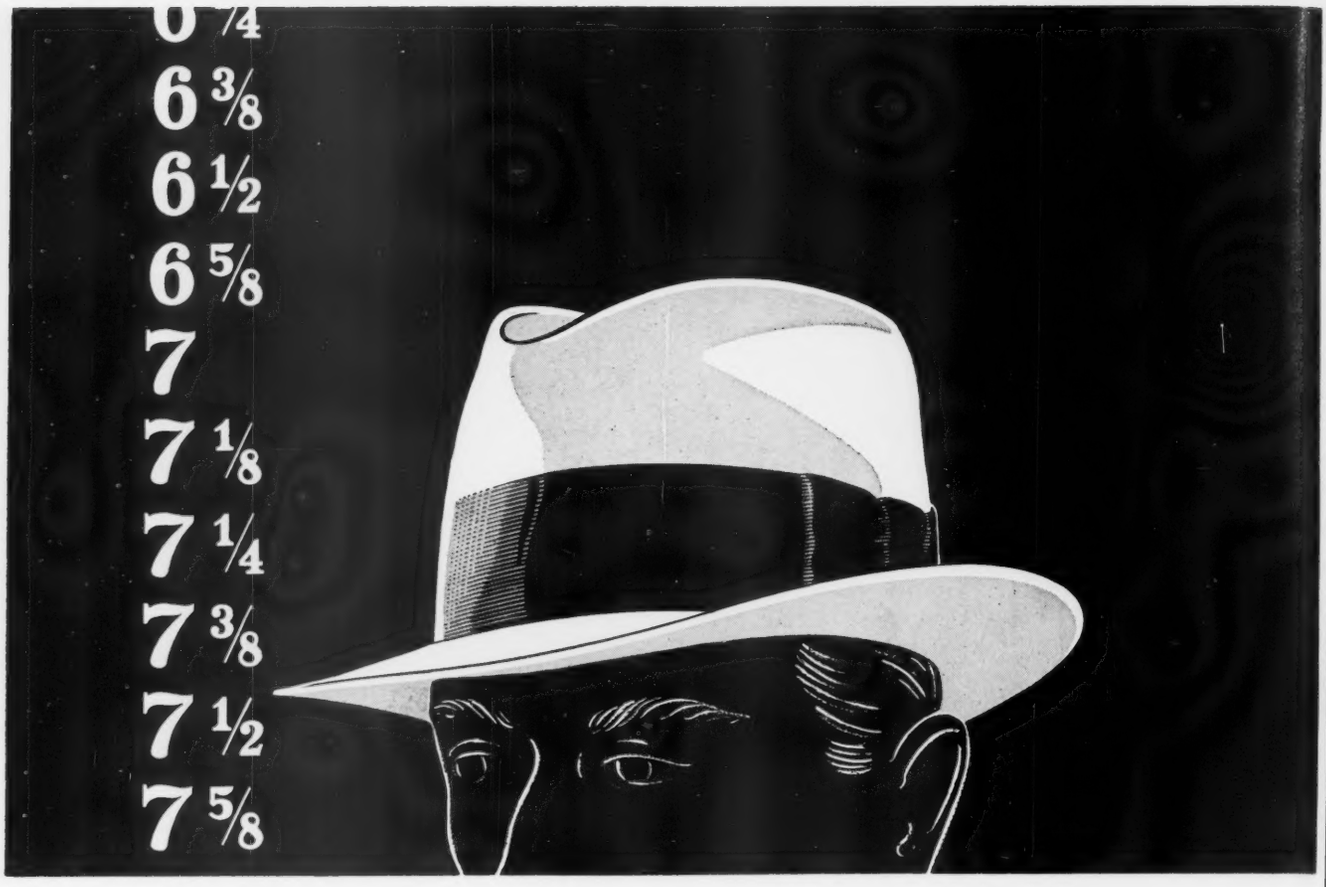
From start to finished mold, the Nicholls #21 Type CF Jolt, Squeeze and Pattern Draw Molding Machine is push-button controlled to eliminate dangerous risks, costly mistakes—to give you better molds *continuously*. Precision built for long years of service . . . made with all the safety-devices, the hidden "quality points" that reduce maintenance costs . . . the know-how that almost half a century of building quality molding machines has made possible. If you're interested in better quality molds at lower cost—investigate these machines now.

For complete information, write to:

William H. Nicholls Co., Inc.

Richmond Hill 18, Long Island, New York

NICHOLLS



WHAT'S *Your* HAT SIZE?

When you buy a hat you buy it to fit. Doesn't it make good sense to buy an annealed shot and grit made to fit YOUR blastcleaning problems—exactly?

If your blastcleaning problem is such that annealed abrasives are the most economical—obviously, that is what you will use. However, it is just as obvious that there is a great deal of difference between just polishing a surface, or removing light sand and scale or removing imbedded sand and cutting—however slightly—into the surface. These three different blastcleaning problems CANNOT BE SOLVED, with equal economy, with ordinary annealed shot and grit. The annealing must be CONTROLLED—the hardness range must be held within narrow limits and within the range best suited to the operation . . . or the greatest economy of operation will not be achieved.

It so happens that Permabrasive Shot and Grit *IS* made in three different hardness ranges with a narrow range of hardness in each. Permabrasive is different because, 1., it is made from *controlled* raw materials of the proper chemical composition to respond UNIFORMLY to heat treating and, 2., because uniform, pellet for pellet, annealing with a new CONTINUOUS process produces assured results. Thus, like buying a hat to an exact head size, you can now buy annealed abrasives to fit your own blastcleaning problem.

There is no obligation involved in having us determine your exact needs. If we can show you even greater savings over your present use of annealed abrasives you're bound to profit. If we can't, you have only lost a three-cent stamp. Please write your name and address on the coupon below and send it to the Hickman, Williams office nearest you. We'll do the rest.

PERMABRASIVE* SHOT AND GRIT *IS PRODUCED EXCLUSIVELY BY*

NATIONAL METAL ABRASIVE COMPANY · CLEVELAND, OHIO

AND SOLD EXCLUSIVELY BY

HICKMAN, WILLIAMS & COMPANY

(INCORPORATED)

CHICAGO · DETROIT
CINCINNATI · ST. LOUIS
NEW YORK · CLEVELAND
PHILADELPHIA · PITTSBURGH
INDIANAPOLIS

OK. You may determine our "size" in annealed abrasives, without any obligation on our part, of course.

Name_____

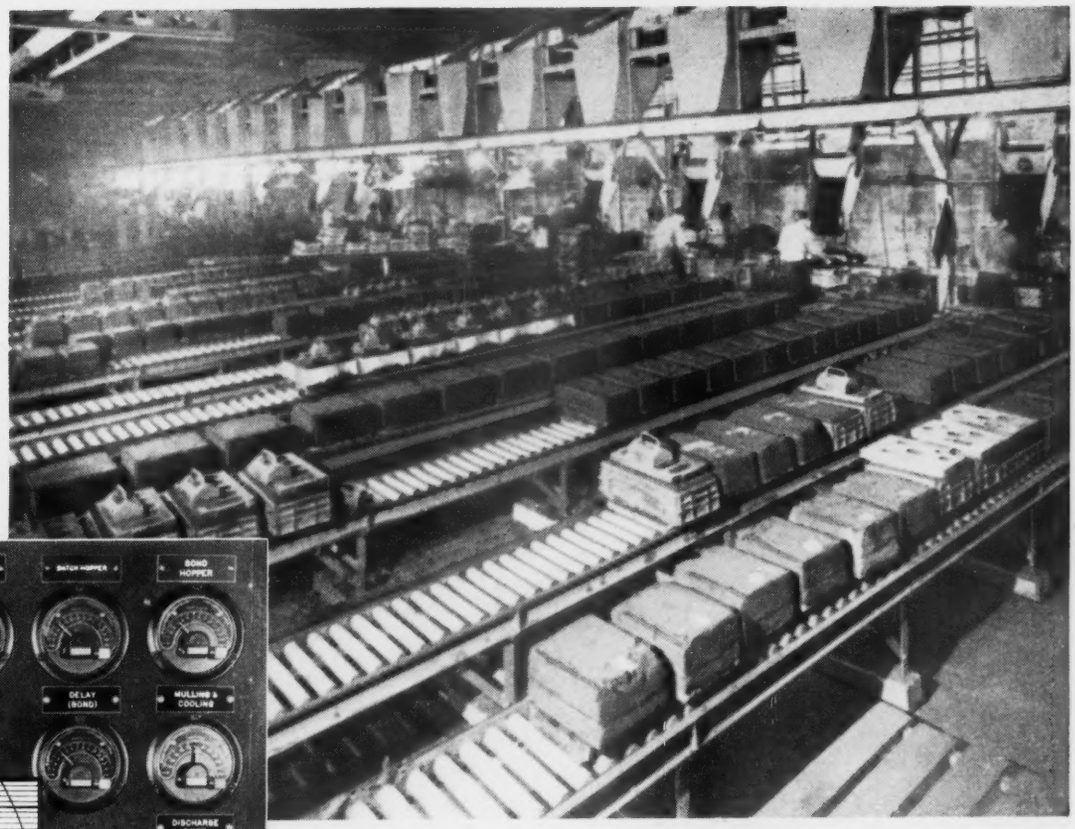
Firm_____

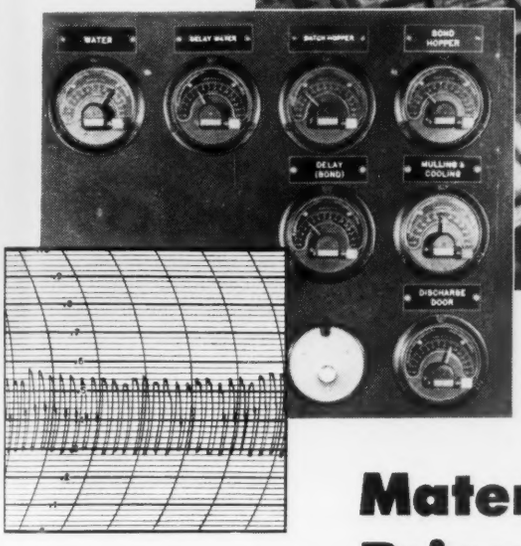
Address_____

City_____

MAIL TO HICKMAN, WILLIAMS OFFICE NEAREST YOU

*Licensed under
U. S. Patent No. 2184926
U. S. Application No. 619602





Factors in this system are timing-cycle control panels and up-to-the-minute graphs of operations.

Knight-Engineered

Materials Handling System Brings 33⅓% Increase in Production Per Man-Hour

for Automotive Parts Manufacturer

Experienced Knight engineers, working with the client's staff, have installed a materials handling process that provides in-line flow of materials in process—without back-tracking. This system has increased man-hour productivity ⅓—reduced floor space ⅓—improved quality control—and lowered unit cost.

The Knight organization of engineers and architects have a broad background in almost every industry. Knight services include:

plant layout • plant design • construction management modernization • mechanization • materials handling • production and cost control • wage incentives • organization • management

If you are interested in any or all of the Knight services, call or write our Chicago or New York office for immediate attention.

EVIDENCE OF EXPERIENCE

Lester B. Knight & Associates, Inc.

Management, Industrial and Architectural Engineers

MEMBER OF THE ASSOCIATION OF CONSULTING MANAGEMENT ENGINEERS, INC.

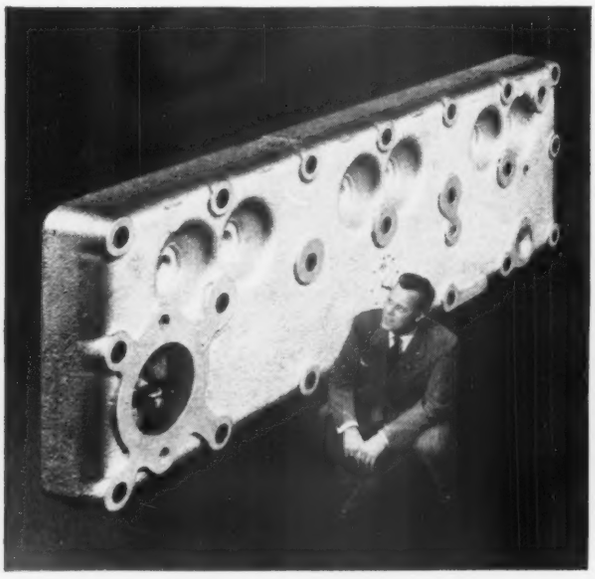
600 W. Jackson Blvd., Chicago 6

Eastern Office—Lester B. Knight & Associates, 50 Church St., New York City 7

Here's where CARBORUNDUM *is going with "man-made minerals"*

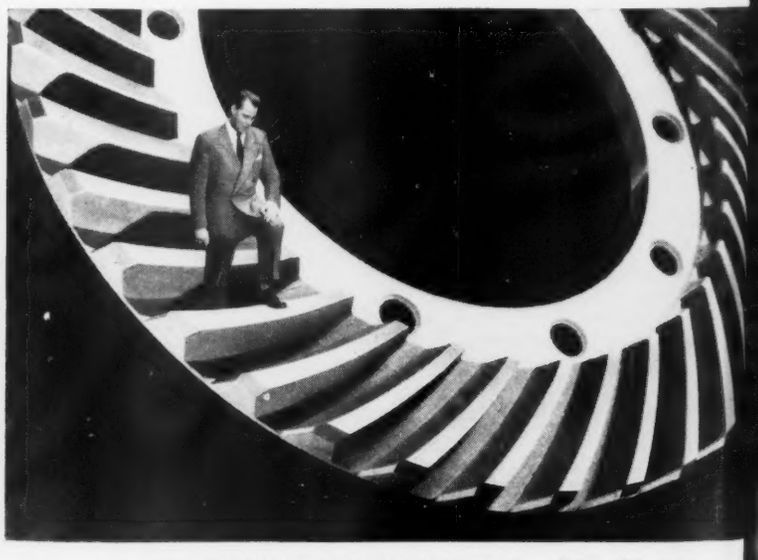
ROCKET EXHAUST LINERS are among the developments by CARBORUNDUM that take over where ordinary materials are inadequate to the task. Produced from *"man-made minerals,"* this super refractory product is highly resistant to the extremes of abrasion and high temperature produced at the rocket nozzle. Super Refractories have been developed by CARBORUNDUM to increase output and reduce operating costs where high temperatures, resistance to abrasion, corrosion or erosion are important factors.

Made by the Refractories Division



CASTINGS ARE IMPROVED in machinability when FERROCARBO, a deoxidizer used in metallurgical processes, is added to the molten metal. This product by CARBORUNDUM is effective in producing the clean castings essential to today's unusual requirements.

Made by the Bonded Products and Grain Division

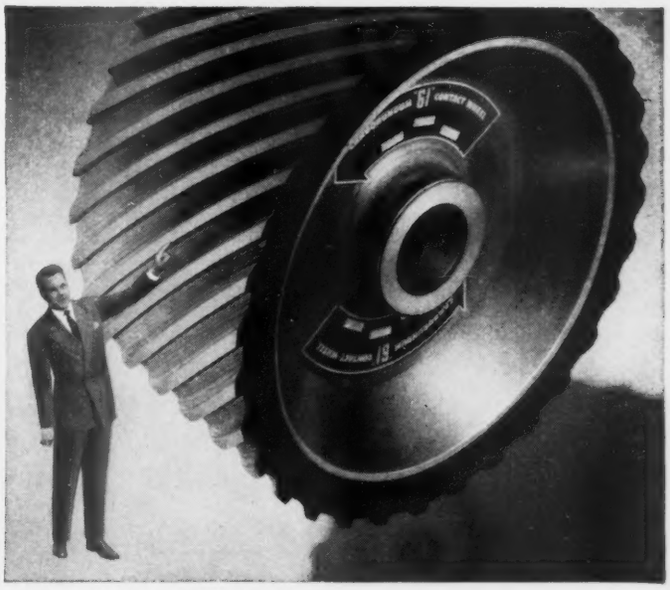


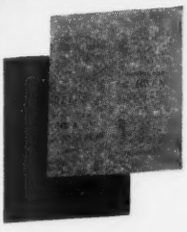
POWDER METALLURGY is a field of interesting new developments. These gears are produced by sintering powdered metal in furnaces equipped with GLOBAR silicon carbide electric heating elements. Having extremely high electrical resistance and no known melting point, the heating elements make it possible to attain high heats under accurate control.

Made by the GLOBAR Division

ABRASIVE BELT LIFE WAS DOUBLED in many applications following the recent introduction of our "61" serrated rubber contact wheel. With this wheel abrasive belts not only retain effective cutting action far longer; they also produce more uniform finishes and turn out more work at less cost.

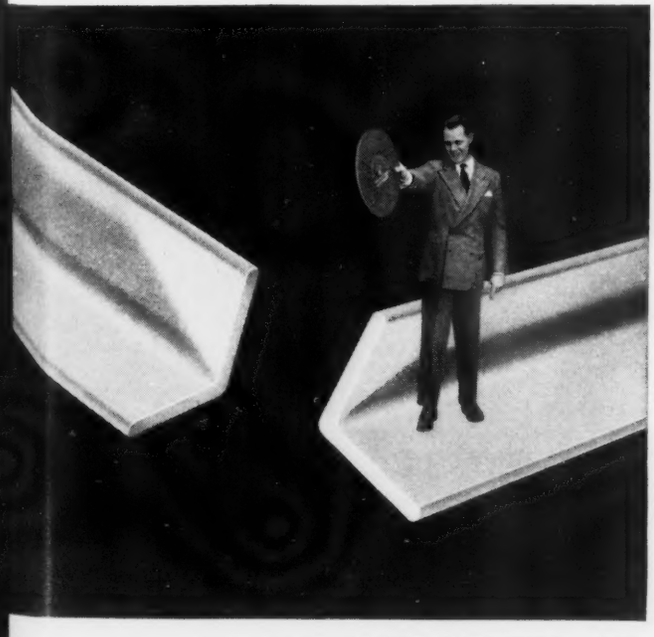
Developed by the Coated Abrasives Division





FURNITURE MAKERS are now using the new extra-hard finishes for increased beauty and durability, aided by RED-I-CUT Waterproof Abrasive Paper developed by CARBORUNDUM. This tough new paper cuts faster, gives a better finish and, as an enthusiastic shop owner expressed it, "more mileage than anything we have ever used."

Produced by the Coated Abrasives Division



SMOOTHER, FASTER CUTTING is subject to unending investigation by CARBORUNDUM. In this field a unique combination of cotton fibres, selected abrasive grains and specially developed organic bonds is now used to produce "MX" abrasives in rigid form. These are exceptionally safe and fast in portable cut-off, deburring, general purpose grinding and similar work. They leave a smooth finish as they cut.

Made by the Bonded Products and Grain Division

Searing flame and erosive gases make life incredibly short for uncooled rocket blast tubes.

Problem without precedent: how to protect the tubes without using costly alloys. Experiment, testing and imaginative thinking resulted in a solution by CARBORUNDUM—molded super refractory liners. Molded, then baked, they must emerge from the oven with tolerances of which a machinist might be proud.

Problems without precedent are the kind we like. In fact our business was born with the invention of a material without precedent, the first "man-made mineral." This was silicon carbide, a product of the electric furnace, which has since become familiar the world over in products by CARBORUNDUM.

Working with characteristics that no mineral in nature offers economically in equal degree, or in the same combinations, CARBORUNDUM has made silicon carbide and aluminum oxide useful to industry in a great diversity of services. A few of these are illustrated here.

If they, or any of the newer forms and applications of "man-made minerals" now under development by CARBORUNDUM, call up possible new or more effective applications in your field, we invite your inquiry.

Look to

CARBORUNDUM

TRADE MARK

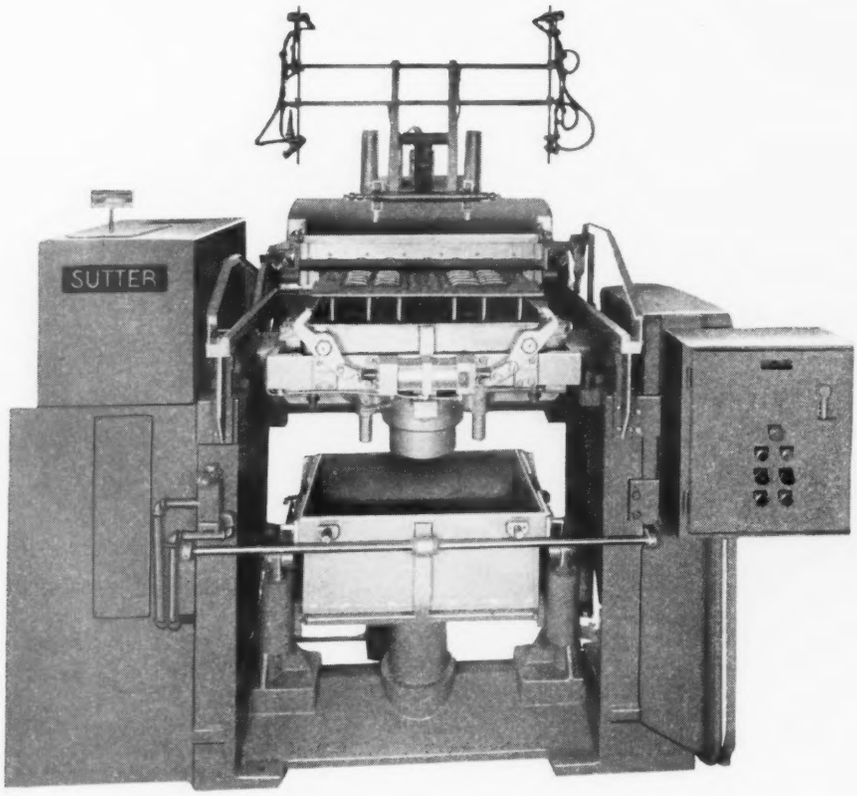
for the real news about "man-made minerals"

THE CARBORUNDUM COMPANY, NIAGARA FALLS, N. Y.

Products by CARBORUNDUM include Grinding and Cutting-Off Wheels, Discs and Sticks...Coated Abrasive Sheets and Belts...Waterproof Abrasive Paper... Abrasive Grain and Powders and other abrasive products...Electric Heating Elements and Ceramic Resistors...Grain and Briquettes for deoxidizing steel and iron... Super Refractory Bricks, Special Shapes and Cements... Porous Filter Media and Diffusers—and are marketed under the following trademarks:

CARBORUNDUM • ALOXITE • MX • RED-I-CUT • GLOBAR • FERROCARBO CARBOFRAX • ALFRAX • MONOFRAX • MULLFRAX

NOW SHELL MOLDING ECONOMIES ON SHORT RUN PRODUCTION, TOO!



SUTTER

AUTOMATIC SHELL MOLDING MACHINES

SEND FOR BULLETIN S

This illustrated bulletin gives complete information on operation and construction of Sutter Shell Molding Machines. Send for yours today. There is no charge or obligation.

Reduced labor costs, better molds, better surface finish and closer tolerances on castings, are but a few of the advantages inherent in the shell molding process. Now those advantages can be had by foundries not running long run production! Sutter Automatic Shell Molding Machines make this possible.

These versatile machines are equipped with standard pattern adaptors. Thus, patterns for a number of jobs can be designed to fit the machine and can be changed over in a matter of minutes. Adjustable coating and curing cams permit easy adjustment of the coating and curing cycles to fit any variety of molds. To keep set-up time to a minimum, it is recommended that each mold be produced in advance of requirements and stored. Since the molds do not deteriorate appreciably, mold storage presents no problem and permits longer runs on your shell molding machine.

Investigate the cost-cutting possibilities of Sutter Shell Molding Machines for your foundry. Built in two standard sizes, they will accommodate 95% of the applications for shell molding without special engineering or costly special construction.

SUTTER PRODUCTS COMPANY

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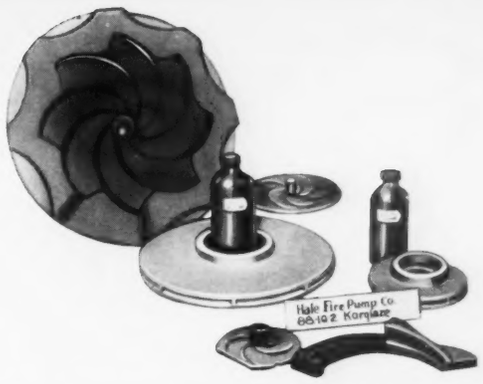
Does your job require a fine, smooth, "as-cast" surface?

for BRASS or BRONZE

KORGLAZE will deliver the right results where no machining can be done and parts must be cast with a clean smooth surface. Korglaze is a vehicle for use with Graphite in coating cores and molds to prevent metal penetration and protect a fine line of cleavage between core and casting.

It will *air dry* leaving the graphite firmly bonded to the surface and the resulting smooth condition of your castings can really be amazing. The cores and impeller castings shown here are by Hale Fire Pump Company together with their specially designed lamp for inspecting the inner as-cast surface of all vanes. The main core is an assembly of segment cores each of which has been coated with Korglaze and Graphite. Write for the story on Korglaze. The saving on finished castings will cover its cost and pay handsome dividends in addition.

Specially designed lamp used to examine inner "as-cast" surfaces of the above impeller casting at Hale Fire Pump Co.



Above shows main core as an assembly of segment cores each coated with KORGLAZE and Graphite.

Linbond No. 742 Core Oil is a fine companion product for use with Korglaze—a top quality clean oil that bakes out fast.

UNITED OIL MFG. COMPANY

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Now . . . Seams Reduced to **ABSOLUTE MINIMUM** on these NEW AO Gloves!

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Yes, for workers' comfort . . . for savings for our customers, we've redesigned our asbestos glove line to eliminate seams wherever possible. By reducing seams from 8 to 3, there's not only greater working ease for the user but longer work life for the glove.

MAKE THIS COMPARISON TEST!

Look at any conventional asbestos glove. Note the vertical seams that extend to the cuff. Note the seams that secure gauntlet to glove. Now check against the large photograph here. You'll see the seams on the thumb and only ONE SEAM extending the length of the glove (on the back). Note also the absence of horizontal seams—(thus assuring a stronger glove and longer life which means valuable savings).

AO 1514 Glove with leather-reinforced palm.

AO 2514 Glove with asbestos-reinforced palm.

AO 3514 Glove with full leather-reinforced palm and finger area.

QUICK FACTS:

- Finest grade specially treated asbestos, recommended for extreme heat.
- Yarn is closely woven.
- Double stitched for long service.

AO's Industrial Vision Program increases production, decreases accidents. Write today for free booklet "Improved Industrial Vision" to 1113 Vision Park, Southbridge, Massachusetts.

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SAFETY PRODUCTS DIVISION

SOUTHBRIDGE, MASSACHUSETTS • BRANCHES IN PRINCIPAL CITIES

Cut Core Costs These 14 Ways

See how Allis-Chalmers revolutionary system of drying sand cores dielectrically lowers foundry costs and improves your product.

1. Rapid baking — Takes but a few minutes; provides more production per unit of floor space.
2. Complete baking at lower temperature—means easier handling—less heat in core room—less fuel used.
3. No burning, no overbaking — It's impossible to overbake edges or thin sections.
4. Low core scrap! Cores are hard and dry the minute they come out of the oven. This reduces breakage in handling.
5. Minimum core storage space — Cores can be made up as needed . . . no need to build up stock.
6. Excellent shakeout characteristics.
7. Lower casting rejects — Cores are *completely* cured.
8. Cores usable at once — No cooling required. Core making can be placed right in casting production set-up.
9. Good collapsibility.
10. No oven warm-up — Unit is ready to go at once. Saves fuel.
11. Good dimensional stability in cores.
12. Smoke and fumes minimized.
13. Smoother casting surface.
14. Cost of oven operation is low.

Get complete details on the *Foundromatic* Sand Core Dryer. Call your nearby Allis-Chalmers district office or write Allis-Chalmers, Milwaukee 1, Wis.

Foundromatic is an Allis-Chalmers trademark.

ALLIS-CHALMERS

QUESTIONS and ANSWERS

About Dielectric Sand Core Drying

Do I need an electronic engineer to help me?

No. Once equipment is installed and operating, any personnel can be quickly trained to follow operating instructions.

How much maintenance is there?

Very little. Periodic oiling of conveyor and blower motors and rollers and replacement of tubes.

Why are resin binders used in place of core oils?

Core oils require high temperatures and long drying time for complete polymerization. Resin binders cure at lower temperatures . . . approximately 250 F.

What about collapsibility?

Resin bonded cores have very good collapsibility, contributing to a faster, cleaner shakeout.

I want a very hard core, but still want good collapsibility. What do I do?

Spray the cores with a film of moisture just before putting them on conveyor belt. This will give high surface hardness without affecting collapsibility.

Can core rods or nails be used?

Yes. When rods or nails are parallel to electrodes no trouble is encountered. When rods or nails are placed vertically in the core they should be of minimum size in relation to core mass and should not protrude through surface of sand.

Will light sections burn if dried with heavy sections?

No. Cores will not burn in the *Foundromatic* core dryer.

SEND

Allis-Chalmers
Milwaukee 1, Wisconsin

Please send me new 8-page booklet 15B7306B containing complete information on the *Foundromatic* sand core dryer.

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USE STERLING FOUNDRY

THE STERLING GRINDING WHEEL CO.
OF THE CLEVELAND ABRASIVE CO.

REMOVAL OF MORE METAL

SNAGGING WHEELS....

These special abrasive units handle easier . . . withstand the shocks and strains of modern snagging operations.

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● For rough, fast metal removal, Sterling's Foundry Grinding Wheels are ideal. Careful study of the correct proportions of special abrasive grains and bonds to use for each job has resulted in a line of better-than-usual wheels that last longer, and provide more and faster grinding. They do their job readily without undue pressure of the wheel against the work... use every abrasive grain to the limit of its cool-cutting capacity. There is no wasteful grinding when Sterling's "Wheels of Industry" are on the job.

Operator fatigue is minimized by careful selection of the proper wheel for your particular job. In competitive tests, Sterling Foundry Grinding Wheels outperform other brands... a test in your cleaning room will quickly prove the superior performance provided by these abrasive units. Write or phone us today for the free services of a Sterling engineer, skilled by years of experience in solving foundry grinding problems. No obligation!

BEST IN THE TEST—THAT'S STERLING

● During a test recently conducted on snagging nodular iron castings for jet engines, a Sterling 20 x 2 x 10 grinding wheel, specification JA143 P8 BFC, provided five days life in comparison with only three days supplied by a competitive wheel. The Sterling unit required a minimum of dressing, and its high quality was such that this manufacturer replaced the other brands with Sterling's "Wheels of Industry". For profitable snagging and longer wheel life, specify Sterling and be certain. We will show you how easy it can be done.

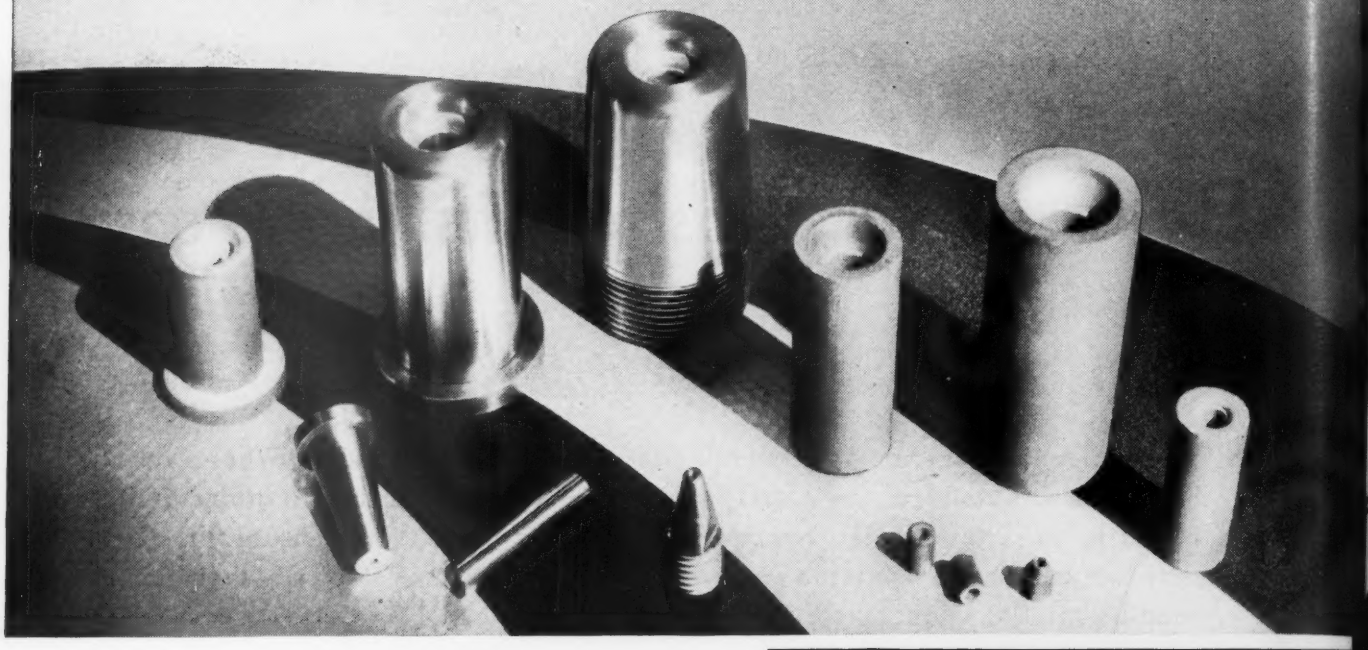
sk for These Free STERLING esearch and Development Folders...

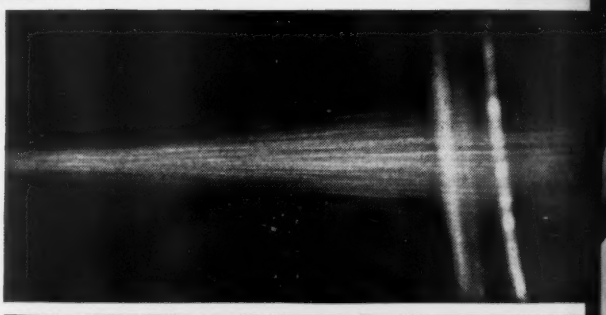
● These free folders are an important data file for you on all types of grinding. Whatever your problem, there is a solution to be found in this interesting literature prepared to make wheel selection quick and easy. Included with these folders is the popular "The Art and Science of Grinding". Write us on your letterhead and we will gladly send your file immediately.

WHEEL DIVISION TIFFIN OHIO

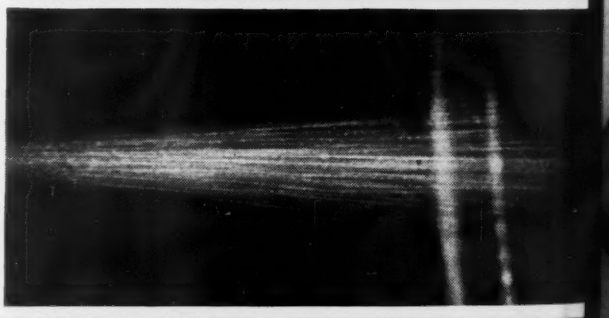
QUARRIES COMPANY

You Can Increase Nozzle Life

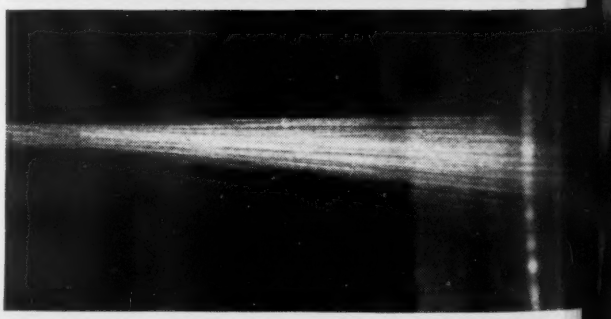




High speed photograph of stream from new iron nozzle — note that stream concentration and abrasive velocity and volume are fair.



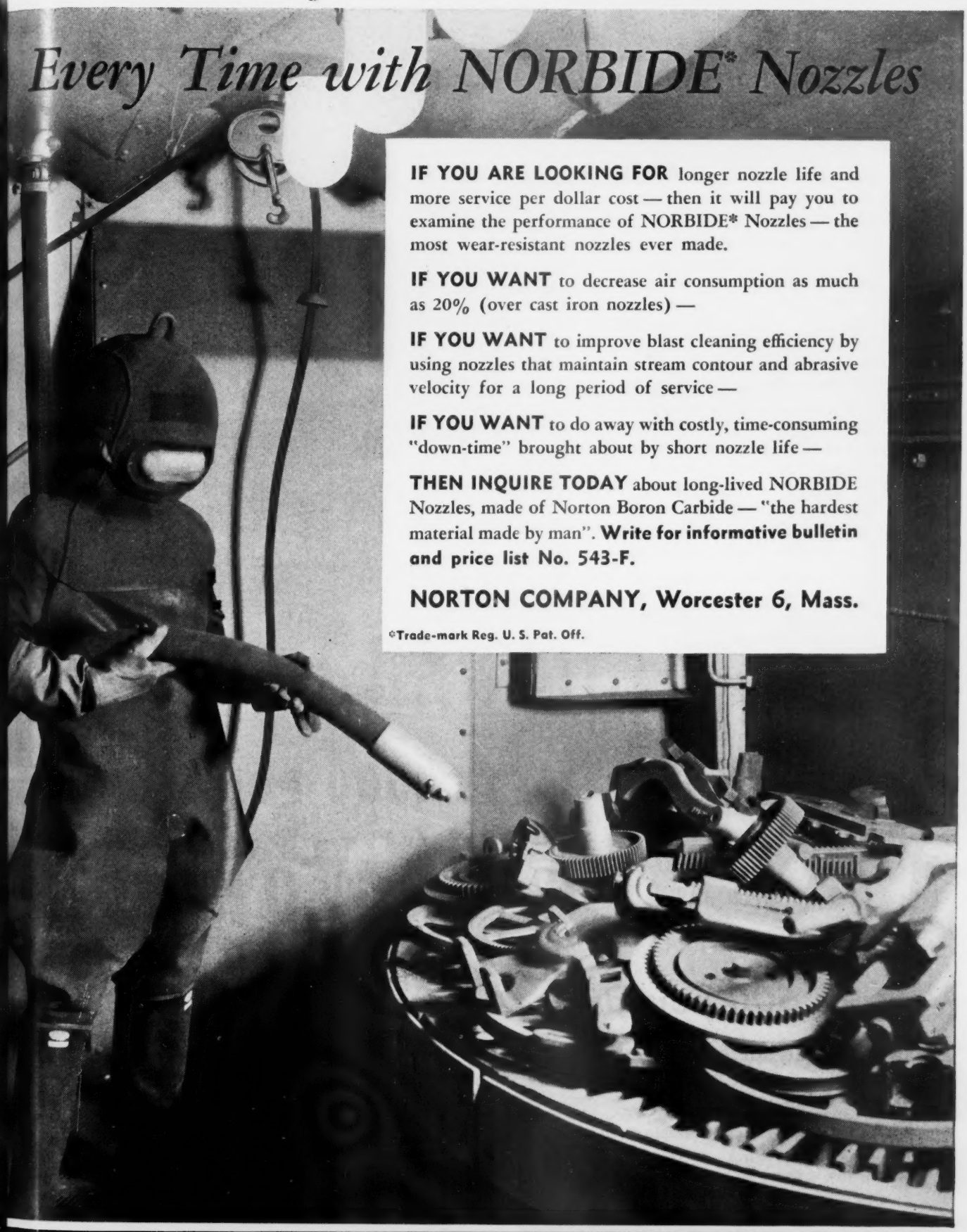
Stream from the same nozzle after three hours with silica sand. Outlet opening worn to twice original size — stream concentration poor, abrasive velocity and volume low.



Stream from Norbide Nozzle after 404 hours with sand — outlet diameter worn only 0.032"—hundreds of hours of useful life remain—marked stream concentration—high abrasive velocity and volume.

NORTON **WEAR-RESISTANT PRODUCTS**

Every Time with NORBIDE Nozzles*



IF YOU ARE LOOKING FOR longer nozzle life and more service per dollar cost — then it will pay you to examine the performance of NORBIDE* Nozzles — the most wear-resistant nozzles ever made.

IF YOU WANT to decrease air consumption as much as 20% (over cast iron nozzles) —

IF YOU WANT to improve blast cleaning efficiency by using nozzles that maintain stream contour and abrasive velocity for a long period of service —

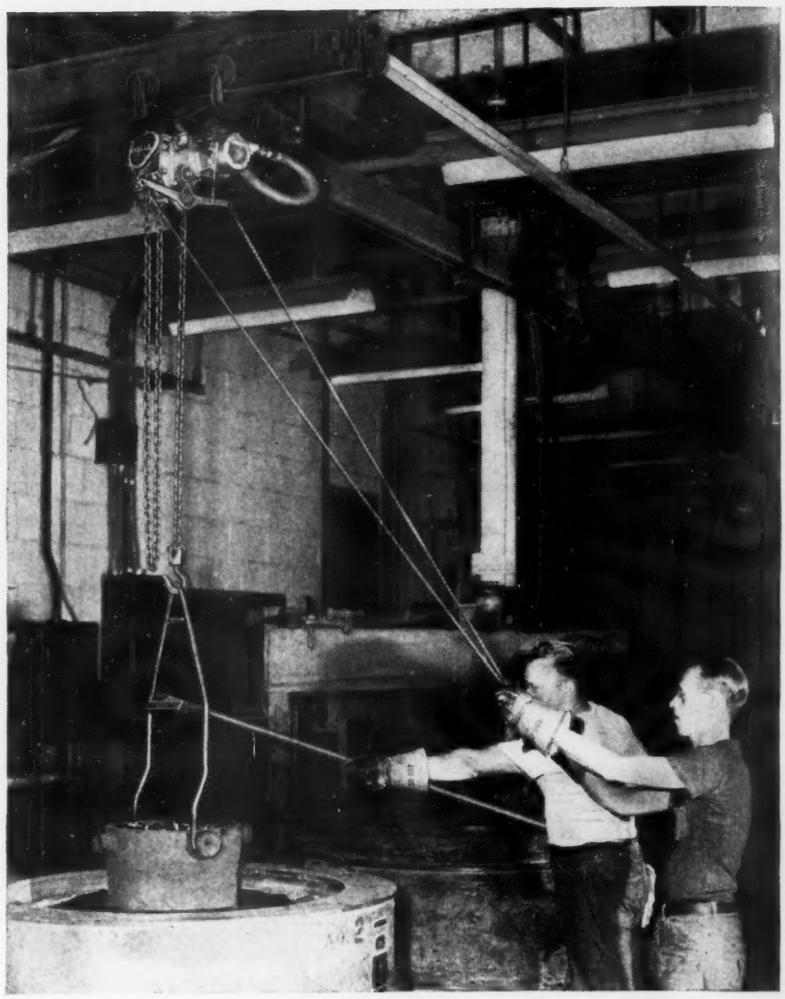
IF YOU WANT to do away with costly, time-consuming "down-time" brought about by short nozzle life —

THEN INQUIRE TODAY about long-lived NORBIDE Nozzles, made of Norton Boron Carbide — "the hardest material made by man". **Write for informative bulletin and price list No. 543-F.**

NORTON COMPANY, Worcester 6, Mass.

*Trade-mark Reg. U. S. Pat. Off.

NORTON COMPANY · WORCESTER 6, MASS. NORTON



LIFTS 1000 POUNDS at 20 feet a minute

. . . or 500 pounds at 42 feet a minute

- This latest CP AIR HOIST — with variable speed, rotary vane air motor — spots loads accurately, quickly; sets them down gently.
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- Air motor cannot overheat — no shock hazard — no spark hazard — no switches to maintain.
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- Weighing only 57 pounds, the CP AIR HOIST can readily be carried by millwright to any location.
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ELECTROMET Data Sheet

A Digest of the Production, Properties, and Uses of Steels and Other Metals

Published by Electro Metallurgical Company, a Division of Union Carbide and Carbon Corporation, 30 East 42nd Street, New York 17, N. Y. • In Canada: Electro Metallurgical Company of Canada, Limited, Welland, Ontario

New Foundry Alloy Neutralizes Effect Of Varying Section in Gray Cast Iron

Low-Carbon Foundry Ferrochrome is a new silicon-chromium alloy specially developed by ELECTROMET for the alloying of cast iron. It is so balanced in composition that it increases the strength and Brinell hardness of gray iron, as well as its resistance to wear and corrosion, without increasing the chilling tendency of the metal.

The alloy has a nominal analysis of 50 per cent chromium and 30 per cent silicon. It has excellent solubility in iron, and the inoculating effect of the silicon content makes it possible to add up to 1 per cent chromium to gray iron as a ladle addition, with no appreciable increase in chill depth. Light-section castings, such as automobile and truck exhaust manifolds and stove parts, may easily be produced in 1 per cent chromium iron by a simple ladle addition of the alloy to any base iron that would be suitable for casting the same parts in unalloyed iron.

Effect on Chill Depth

Fig. 1 illustrates how chill depth was affected by varying additions of the new alloy to a commercial cupola iron analyzing 3.24 per cent carbon and 2.12 per cent silicon, with 0.12 per cent residual chromium. A chill depth of approximately ¼ of an inch was obtained in all of these typical hatchet-type chill-test specimens.

Effect on Mechanical Properties

Although Low-Carbon Foundry Ferrochrome was especially developed for decreasing the section sensitivity of gray iron castings, it is also useful in obtaining moderate increases in the strength of gray iron, when used alone or in combination with the alloys nickel, molybdenum, or vanadium. An unalloyed base iron, analyzing 3.43 per cent carbon and 1.95 per cent silicon, was treated with additions of 0.36 per cent and 0.84 per cent chromium. The following table gives the complete analyses of the irons. It shows how both Brinell hardness and tensile strength were improved by the alloying additions.

Analyses	Brinell Hardness	Tensile Strength
3.43 % total carbon, 1.95% Si, 0.05% Cr.....	202	31,000
3.41% total carbon, 2.20% Si, 0.36% Cr.....	217	35,400
3.32% total carbon, 2.56% Si, 0.84% Cr.....	228	36,100

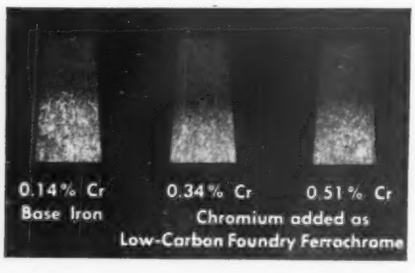


Fig. 1. These fractures of broken chill specimens show the effect on chill of chromium additions made with Low-Carbon Foundry Ferrochrome.

Auto Cylinder Castings

Addition of chromium to cast iron in the form of Low-Carbon Foundry Ferrochrome tends to stabilize the pearlitic structure of the iron, and to eliminate areas of soft secondary ferrite in slowly cooled sections. Moreover, the alloy helps avoid difficulties with chilled corners or edges in thin sections. It is therefore particularly well suited for producing a cylinder-type iron with consistently good structure and improved uniformity of hardness in sections exposed to widely varying cooling rates.

An example of the usefulness of this alloy is illustrated in Fig. 2, which shows strips cut from the bores of three automotive cylinder blocks. The base iron used in these castings was a typical unalloyed cylinder grade of cast iron, analyzing 3.38 per cent total carbon, 2.07 per cent silicon, and 0.08 per cent residual chromium.

The design of these castings was such that a heavy boss close to the cylinder bore caused slow cooling along one side, resulting in a soft area and wide variation in hardness along the length and around the perimeter of the unalloyed cylinder.

The strips illustrated in Fig. 2 were cut from the soft side of the cylinder bore. When subjected to a Rockwell B hardness exploration, casting No. 1 showed a variation in hardness from 92.2 to 80.2 Rockwell B (196 to 150 Brinell*). Casting No. 2 showed a variation from 94.0 to 90.8 Rockwell B (205 to 189 Brinell). Casting No. 3 showed a variation from 95.5 to 90.3 Rockwell B (213 to 187 Brinell).

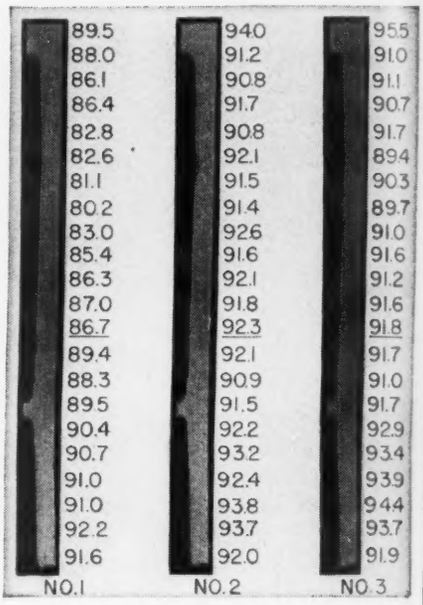


Fig. 2. Average Rockwell B hardness values at indicated positions in strip specimens from the bores of three cylinder block castings. No. 1-Untreated base iron containing 0.08% chromium. No. 2-Treated with 0.31% chromium added as Low-Carbon Foundry Ferrochrome. No. 3-Treated with 0.44% chromium added as Low-Carbon Foundry Ferrochrome.

The small chromium additions made in cylinders Nos. 2 and 3 had a marked effect in reducing the hardness spread and also in stabilizing the desired pearlitic structure in critical areas of the cylinder bore. This provided satisfactory resistance to wear in spite of difficulties introduced by an admittedly difficult design. Similar problems exist in most iron foundries—problems that Low-Carbon Foundry Ferrochrome can help solve with a minimum change in melting practice and at a very reasonable cost.

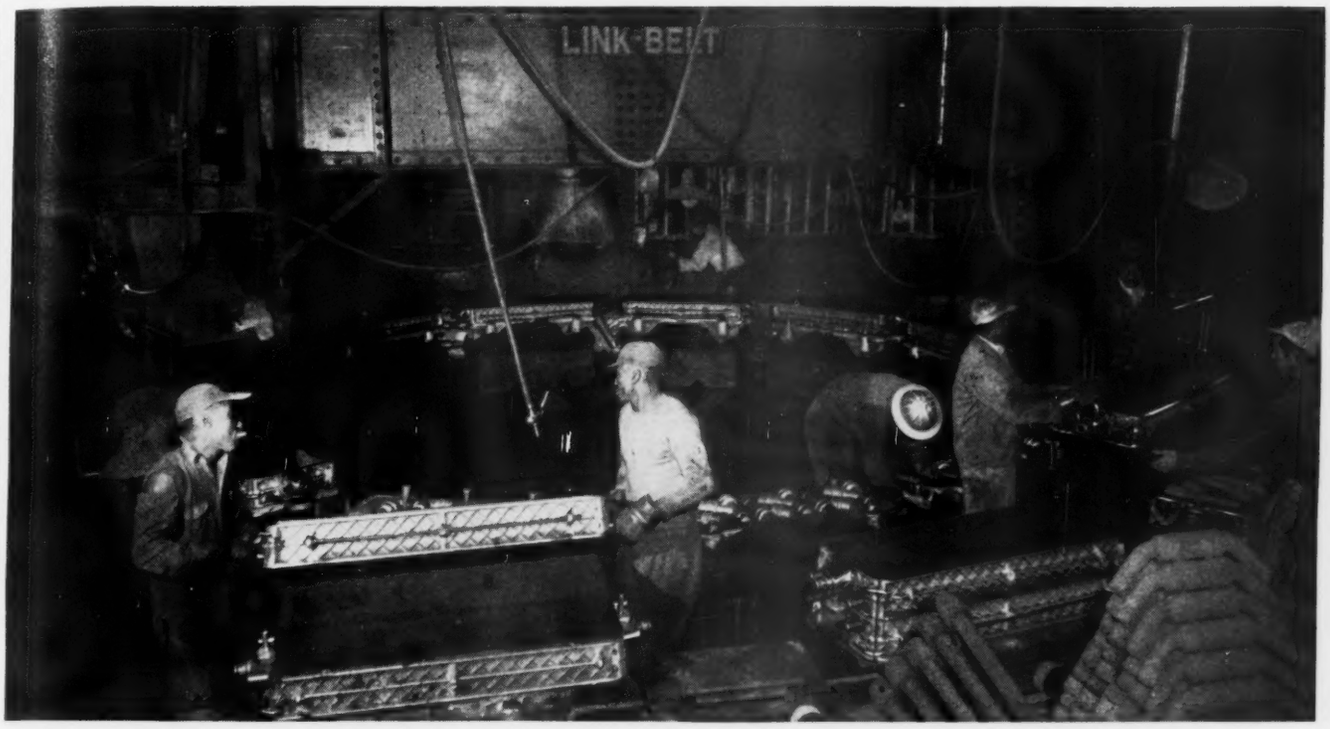
Booklets Available

Further information about this new ferrochrome is given in the booklets, "New Chromium Alloy Neutralizes Effect of Varying Cooling Rate in Gray Iron" and "Silicon-Chromium Alloy in Complicated Iron Castings." You may obtain copies, free of charge, by writing or phoning to the nearest ELECTROMET office: in Birmingham, Chicago, Cleveland, Detroit, Los Angeles, New York, Pittsburgh, or San Francisco. In Canada: Welland, Ontario.

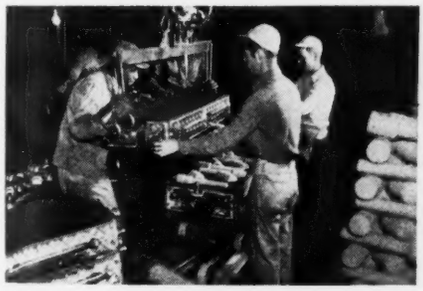
*All Brinell hardness values were obtained by conversion from Rockwell B.

The term "Electromet" is a registered trade-mark of Union Carbide and Carbon Corporation.

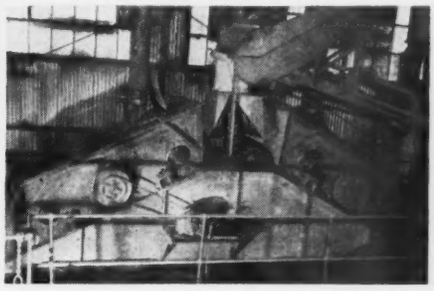
LINK-BELT helps Central Foundry step up production



1 Mechanization by Link-Belt at Central Foundry Co., Holt, Alabama, has resulted in increased production and better working conditions. Continuously moving Tru-Trac mold conveyor, above, is 110 ft. long.

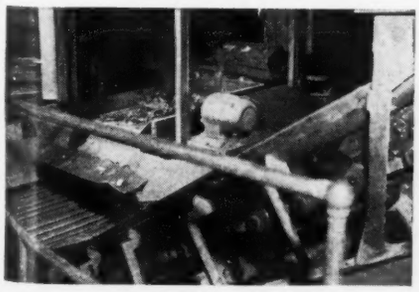


2 After cores have been set, molds are closed. Tru-Trac Conveyor continues to pouring station, thence through cooling zone to central shakeout point.



3 Twin UP Vibrating Screens over the storage bin receive sand from elevator and shakeout via belt conveyor. Large sand capacity necessitates dual installation.

4 Uniform and proper sand conditioning is continuously obtained at Central Foundry. Two muller type mixers shown here prepare and cool the sand.



5 Tilting top trays discharge molds to shakeout. Castings go over end of shakeout screen to apron conveyor. Complete mold, sand and castings handling equipment was designed, built and installed by Link-Belt.

If you have a mechanization or sand preparation problem in your foundry, a Link-Belt foundry engineer will be glad to discuss it with you or your consultants. For complete information, call the Link-Belt office near you.

LINK-BELT

CONVEYORS and PREPARATION MACHINERY

MEMBER FEMA

LINK-BELT COMPANY: Chicago 9, Indianapolis 6, Philadelphia 40, Atlanta, Houston 1, Minneapolis 5, San Francisco 24, Los Angeles 33, Seattle 4, Toronto 8, Springs (South Africa), Sydney (Australia). Offices in Principal Cities.

12,828

OTHER DINGS PRODUCTS FOR THE FOUNDRY—

Electric and Non-electric Magnetic Pulleys

Non-electric Magnetic Drums

Non-electric Perma-Plate Magnets

Self-Cleaning Perma-Plate Magnets

Rectangular Suspended Magnets

Self-Cleaning Rectangular Suspended Magnets

Portable and Stationary Pulley-type Separators

DINGS ALL-WELDED, WEATHERPROOF LIFTING MAGNETS:

- LIFT A LITTLE *MORE*
- WEIGH A LITTLE *LESS*
- LAST A LITTLE *LONGER*
- — *BUT COST NO MORE*

BACKED by over 50 years of experience in the field of electro-magnet construction. Dings has supplied more foundries with magnetic separators than any other firm. When you need a lifting magnet check the DINGS.

Write for catalog B-1401-A giving construction details, capacities, ratings and dimensions.

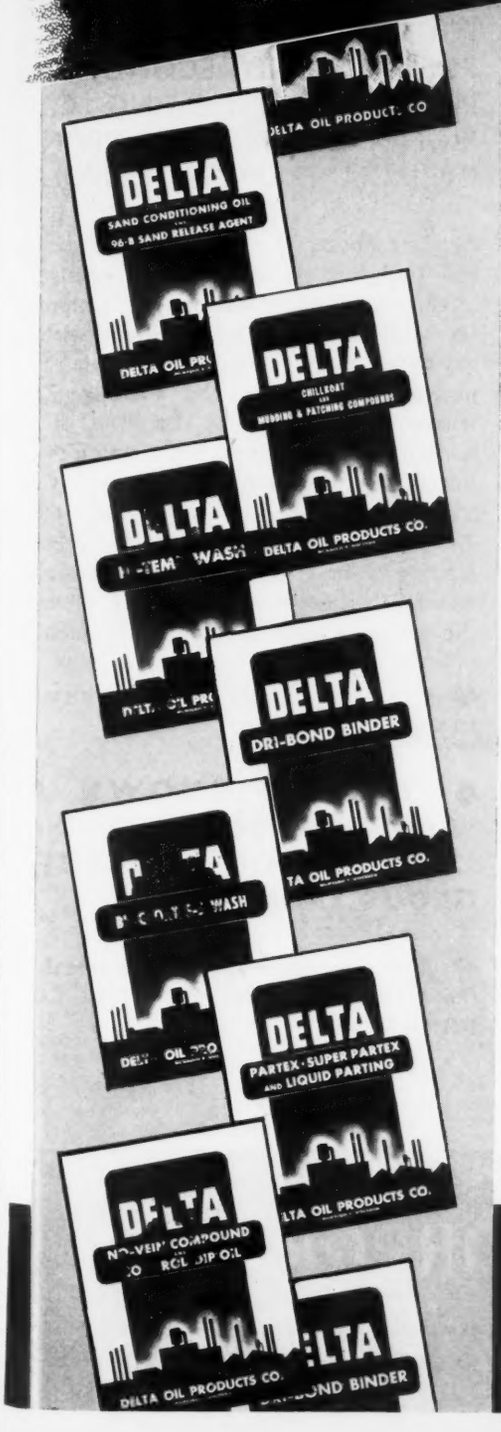
DINGS MAGNETIC SEPARATOR COMPANY
4708 W. Electric Ave., Milwaukee 46, Wis.

Dings Magnets

LM-3

DELTA *Specialized* FOUNDRY PRODUCTS

FOR FASTER PRODUCTION OF FINER-FINISH CASTINGS *... at lower cost!*



FOR SAND

DELTA Permi-Bond (seacoal replacement)
Sand Conditioning Oils
96-B Sand Release Agent

FOR CORES

DELTA Core & Mold Washes for steel, malleable, gray iron and non-ferrous metals.
Mudding and Patching Compounds
No-Vein Compound
Dri-Bond Binder
Core Rod Dip Oils
Sand Conditioning Oils
Core Oils
Partex
Liquid Parting
Bondite

FOR MOLDS

DELTA Core & Mold Washes for steel, malleable, gray iron and non-ferrous metals.
Partex (Nut Shell Parting)
Liquid Parting
Spray Binders
Bondite

The quality and uniformity of DELTA SPECIALIZED FOUNDRY PRODUCTS are laboratory controlled to insure consistent results in use. Liberal working samples, together with complete instructions for use will be sent to you without cost or obligation. WRITE TODAY.

DELTA OIL PRODUCTS CO.

MANUFACTURERS OF
SPECIALIZED FOUNDRY PRODUCTS
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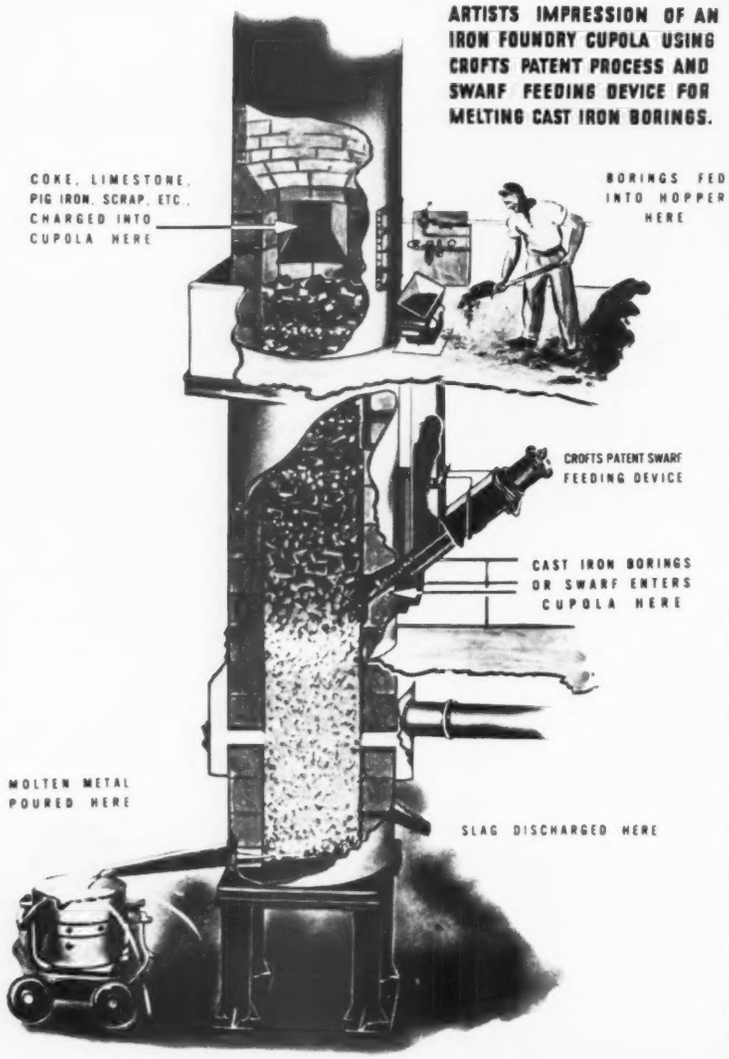
"CROFTS PROCESS"

FOR MELTING CAST IRON BORINGS, CHIPPINGS AND OTHER MATERIALS IN IRON FOUNDRY CUPOLAS . . .

PATENTS PENDING


COKE, LIMESTONE, PIG IRON, SCRAP, ETC., CHARGED INTO CUPOLA HERE
BORINGS FED INTO HOPPER HERE
CROFTS PATENT SWARF FEEDING DEVICE
CAST IRON BORINGS OR SWARF ENTERS CUPOLA HERE
MOLTEN METAL POURED HERE
SLAG DISCHARGED HERE

ARTISTS IMPRESSION OF AN IRON FOUNDRY CUPOLA USING CROFTS PATENT PROCESS AND SWARF FEEDING DEVICE FOR MELTING CAST IRON BORINGS.

● FOR THE FIRST TIME WE ARE ABLE TO INTRODUCE TO THE FOUNDRY INDUSTRY A NEW, POSITIVE AND ECONOMICAL PROCESS FOR MELTING CAST IRON BORINGS OR CHIPPINGS IN IRON FOUNDRY CUPOLAS.

● The operating principle is both simple and foolproof. It consists of directly injecting Cast Iron Borings or Chippings (as received from Machine Shops without any preparation) into the Cupola at a position just above the Melting Zone whereby the weight of the mass of the normal Charge prevents the ejection of the Borings by the Cupola blast. The Cast-Iron Borings immediately enter the Melting Zone and are rapidly heated to their melting point and merge with the molten metal. This method reduces to a minimum the period of oxidation and loss in melting.

● The Charging Device is easily attached to any Cupola.

● **THIS IS KNOWN AS "CROFTS PROCESS" AND IS LICENCED ON ADVANTAGEOUS CONDITIONS.**

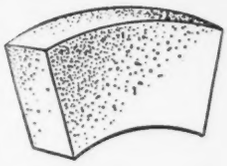
● **Full information can be obtained from the MEEHANITE METAL CORPORATION.**

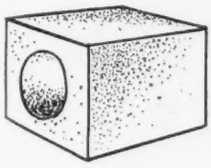
MEEHANITE METAL CORPORATION

PERSHING BUILDING · NEW ROCHELLE · NEW YORK

TELEPHONE: NEW ROCHELLE 2/3840 CABLE ADDRESS "MEEHANITE"

For Longer Lining Life Use . . .
WALSH Missouri-Quality REFRACTORIES for the FOUNDRY INDUSTRY





FIRE BRICK

Brand	Type	Fusion Point	Uses
WARCO XXT (Missouri High Heat Duty)	Dealred Stiff Mud	Cone 32-33 (3173° F.)	Metallurgical furnaces where slag and abrasive action is severe. Malleable furnace side walls.
BUNG BRICK (Missouri Super Duty)	Dry Press	Cone 34 (3200° F.)	Malleable furnace roofs.
MULLITEX (Missouri Super Duty	Dry Press	Cone 34 (3200° F.)	Furnaces operating at high temperatures with sudden temperature changes. Malleable furnace bottoms and roofs, non-ferrous furnace linings.
MULLITEX HB (Missouri High Burn Super Duty)	Dry Press	Cone 34 (3200° F.)	Highly resistant to slag, abrasion, shrinkage and sudden temperature changes. Electric furnace roofs ferrous and non-ferrous furnace linings.
APEX (Missouri Extra Duty)	Dealred Stiff Mud	Cone 34-35 (3200-3245° F.)	Wherever high temperatures, slag, abrasion and corrosive action prevail.

Walsh also makes: Cupola Blocks, Tap Out Brick, Slag Hole Block, Ladle Bottoms, High Temperature Ferrous and Non-Ferrous Furnace Linings.

PLASTICS

Brand	Max. Service Temp.	Fusion Point	Packaging	Type	Uses
GRAFLOK (Missouri Super Duty with Graphite Base) (Wet or Dry)	3000° F.	Cone 33-34	500 lb. drums 100 lb. cartons 100 lb. bags	Air & Heat Setting	For ram lining bull ladles, spouts, runners, patching, where molten metal covers and forms seal resulting in longer life, cleaner castings.
K-11 PLASTIC (Wet or Dry)	3200° F.	Cone 36-37	100 lb. cartons 225 lb. drums 500 lb. drums 100 lb. bags	Air & Heat Setting	Withstands electric furnace temperatures and conditions. Excellent for rammed linings, spouts, runners, burner ports, pit furnaces, patching.

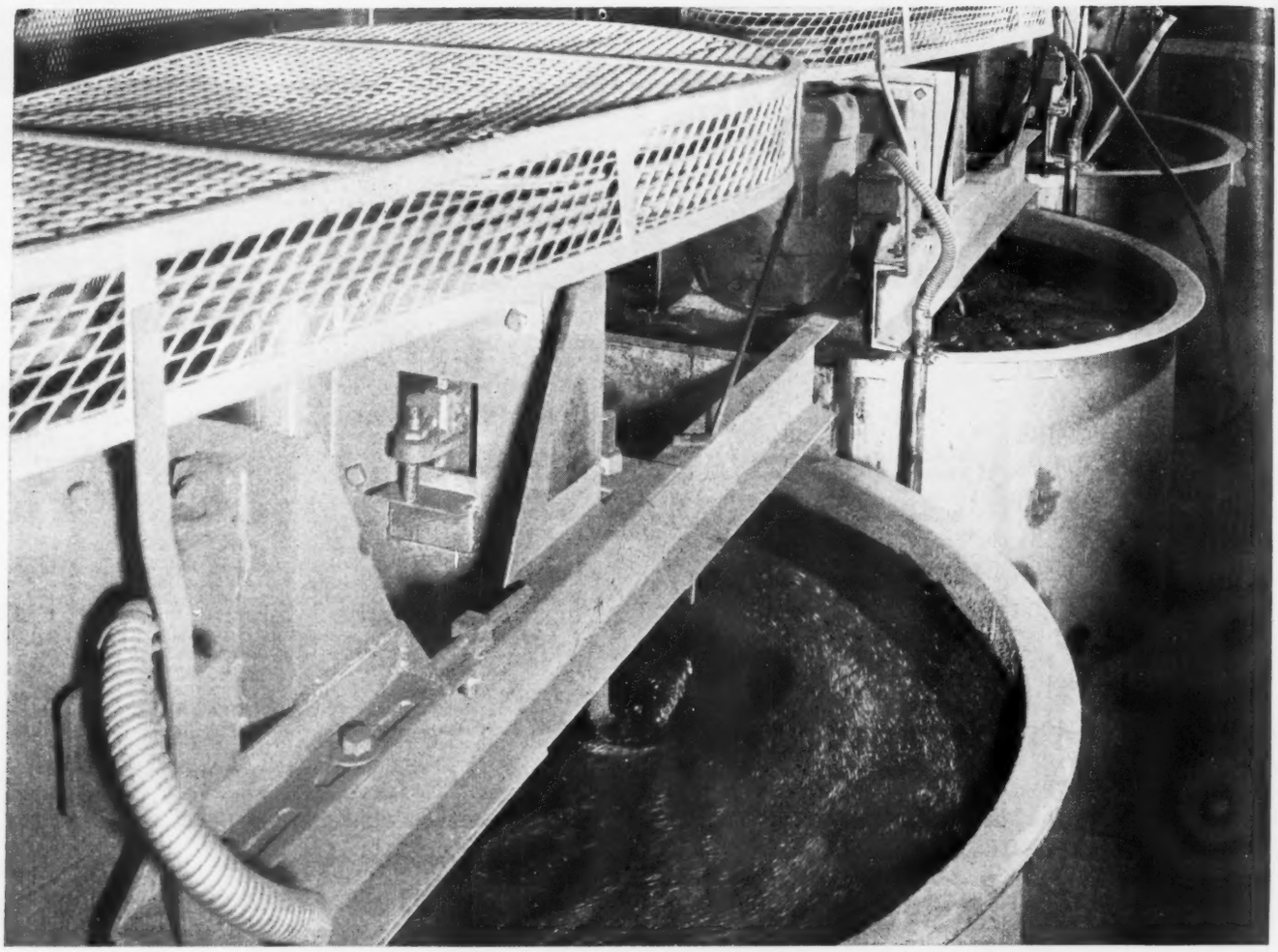
CEMENTS

Brand	Max. Service Temp.	Fusion Point	Packaging	Type	Uses
GRAFLOK LADLE COATING (Dry) (Missouri Super Duty with Graphite Base)	3000° F.	Cone 33-34	100 lb. bags	Heat Setting	For brush coating over Graflok Plastic. Affords added protection and longer life.
MULLITEX CEMENT (Wet or Dry)	3150° F.	Cone 34-35	100 lb. bags 200 lb. drums 500 lb. drums	Heat & Air Setting	For laying up and surfacing fire brick subjected to severe joint erosion.
METALOK (Missouri Super Quality Mortar—Dry)	3200° F.	Cone 36	100 lb. bags	Heat Setting	Unusually resistant to slag action—highly suitable for laying up fire brick in malleable furnace sidewalls, ladles, hot metal mixers, electric furnaces, etc.

WALSH
REFRACTORIES CORPORATION
ST LOUIS MISSOURI U.S.A.

Walsh also supplies the foundry with Fire Clays, Ground Fire Clays, Milled Foundry Clays, Super Duty Plastic Furnace Linings, Castables and other Refractory Specialties.

101 FERRY STREET, ST. LOUIS 7, MISSOURI
FACTORIES: ST. LOUIS AND VANDALIA, MISSOURI



Foundry Sand Costs Can Be Cut As Low As 75¢ A Ton With Denver Reclamation

You can increase your profits by using a Denver Sand Reclamation System. If your new foundry sand costs, delivered, are above $2 a ton, you can cash in on extra profits with Denver reclamation. Denver Sand Reclamation Systems recover sand for as low as 75c a ton. Many foundries prefer reclaimed sand for quality castings.

Denver Sand Reclamation Systems report daily savings of $200 to $400 on new sand costs. One of the big factors of high production and low costs is the patented Denver Heavy Duty Sand Scrubber, pictured above. Bonding material and slime on the surface of sand grains are removed by attrition of grains striking one another at high velocity in a water and sand mix.

Controlled recirculation without short circuiting insures complete scrubbing. Scrubbing mechanisms are of extra heavy construction with abrasion-resistant rubber covered parts in areas of high wear. The scrubber will start on a full load—no sanding up on shutdowns. Water consumption is low. You get simplicity of installation and operation, and an 80% to 90% recovery.

Equipment cost for the average small foundry, treating 2 to 3 tons of sand an hour, is approximately $6,250 fob factory, exclusive of drying equipment.

Denver Equipment Company has been a leader in mineral flotation and recovery equipment for 25 years. Our engineers can plan and supply you with all necessary equipment for a complete Foundry Sand Reclamation System. Find out how you can cut your foundry sand costs to as low as 75c a ton! Write, wire or phone today for test, horsepower and floor space data.

DECO FLOTATION ENGINEERING — DENVER EQUIPMENT COMPANY — 24 HOUR SERVICE

Our 25th year

DENVER EQUIPMENT COMPANY

1400 SEVENTEENTH ST. DENVER, COLORADO

"SO THAT'S WHERE THOSE LITTLE PIGS WENT!"

CHIEF KEOKUK: Sure enough, dear! Thousands of Electro-Silvery pigs were melted down to help make the iron and steel for those skyscrapers . . .

PRINCESS WENATCHEE: . . . and wasn't Electro-Silvery used in making the metal for this boat we're on, and for tanks and tractors and automobiles?

CHIEF KEOKUK: Right! It's hard to find *any* type of product made of iron or steel that *doesn't* use Electro-Silvery!

CHIEF KEOKUK JR: Gosh, Pop, what *is* Electro-Silvery?

CHIEF KEOKUK: Electro-Silvery, son, is a form of ferro-silicon that acts as a vital control element in the production of iron and steel . . .

PRINCESS WENATCHEE: . . . and the world's largest producer of this vital ingredient is the Keokuk Electro-Metals Company!

KEOKUK

ELECTRO-METALS COMPANY

KEOKUK, IOWA

WENATCHEE DIVISION: WENATCHEE, WASHINGTON

Keokuk Electro-Silvery is used by foundries and steel plants in the form of these three pigs, weighing 60 pounds . . . 30 pounds . . . and 12½ pounds.

SALES AGENTS: MILLER AND COMPANY

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3504 Carew Tower, Cincinnati 2, Ohio
915 Olive St., St. Louis 1, Missouri

There is no substitute for Highest Quality

For your greater prosperity there are standard and custom made, uniform Macklin Grinding Wheels ready to give you cost saving results. They are made in any size, shape, grain or grade to meet your requirements and to "Protect Your Production." Ask for the services of a Macklin Field Engineer.

1927 SILVER 25th ANNIVERSARY 1952

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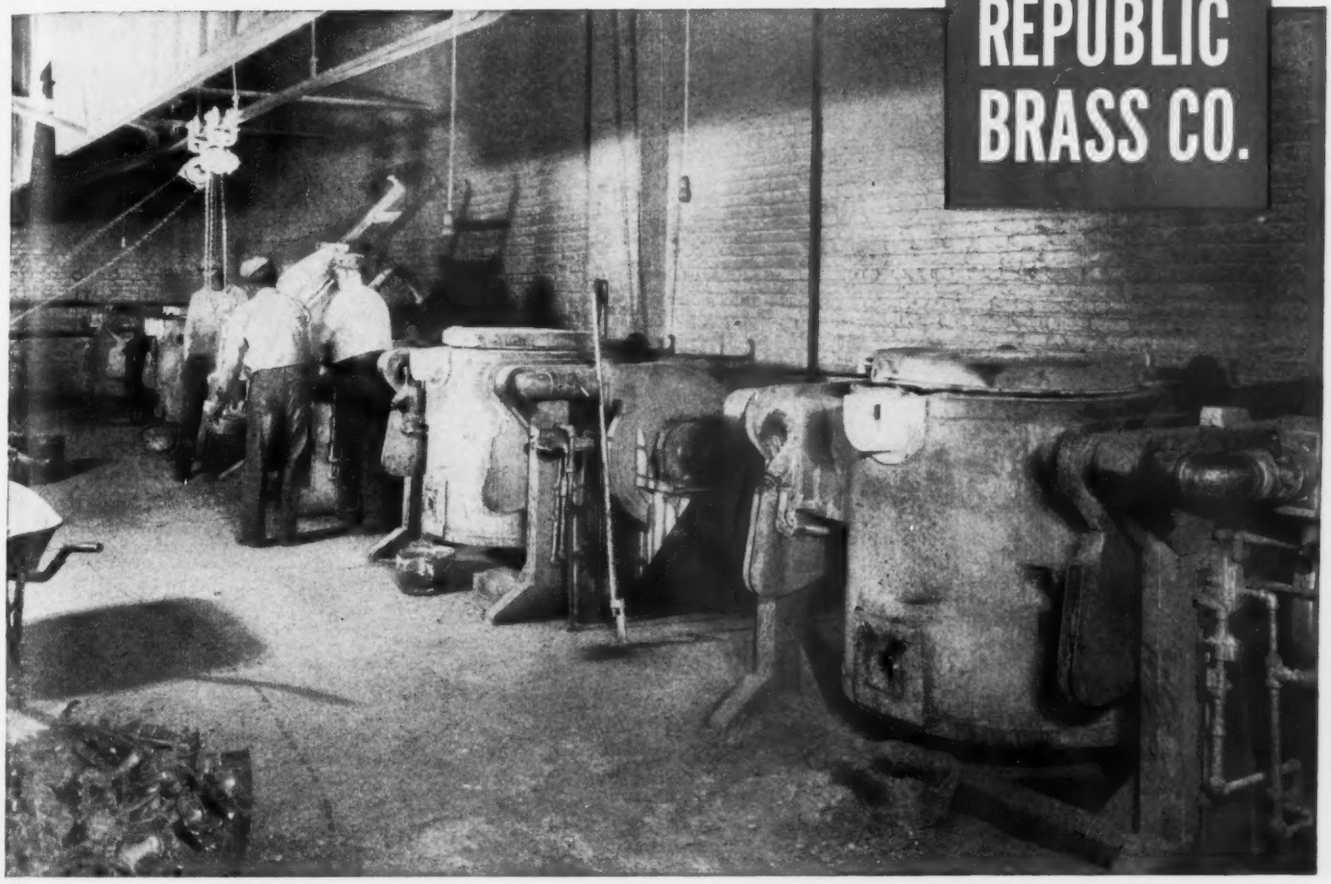
6 LINDBERG-Fishers for 6 years

and all's well at REPUBLIC BRASS CO.



LINDBERG-Fisher BRASS MELTING FURNACES STAND THE GAFF

All's well at The Republic Brass Co., (Division of Briggs Mfg. Co.), Cleveland, Ohio—manufacturer of water faucets and related plumbing fixtures. In 1945, as part of a modernization program, Republic installed six Lindberg-Fisher brass melting furnaces. These oil fired, constant arc, nose-pouring furnaces have more than withstood the test of time . . . and maintenance has been almost nil.

Here's what Mr. J. J. Smith, Republic's foundry superintendent thinks of his six Lindberg-Fisher brass melting furnaces:

"We have had six Lindberg-Fisher brass melting, nose-pouring, 1200 pound capacity furnaces for six years, and have had very good results from them . . . they deliver more than 100 heats per crucible . . . one hour twenty minutes per heat . . . 18 months lining life. They have performed very satisfactorily as to upkeep, and we have had excellent operating results."

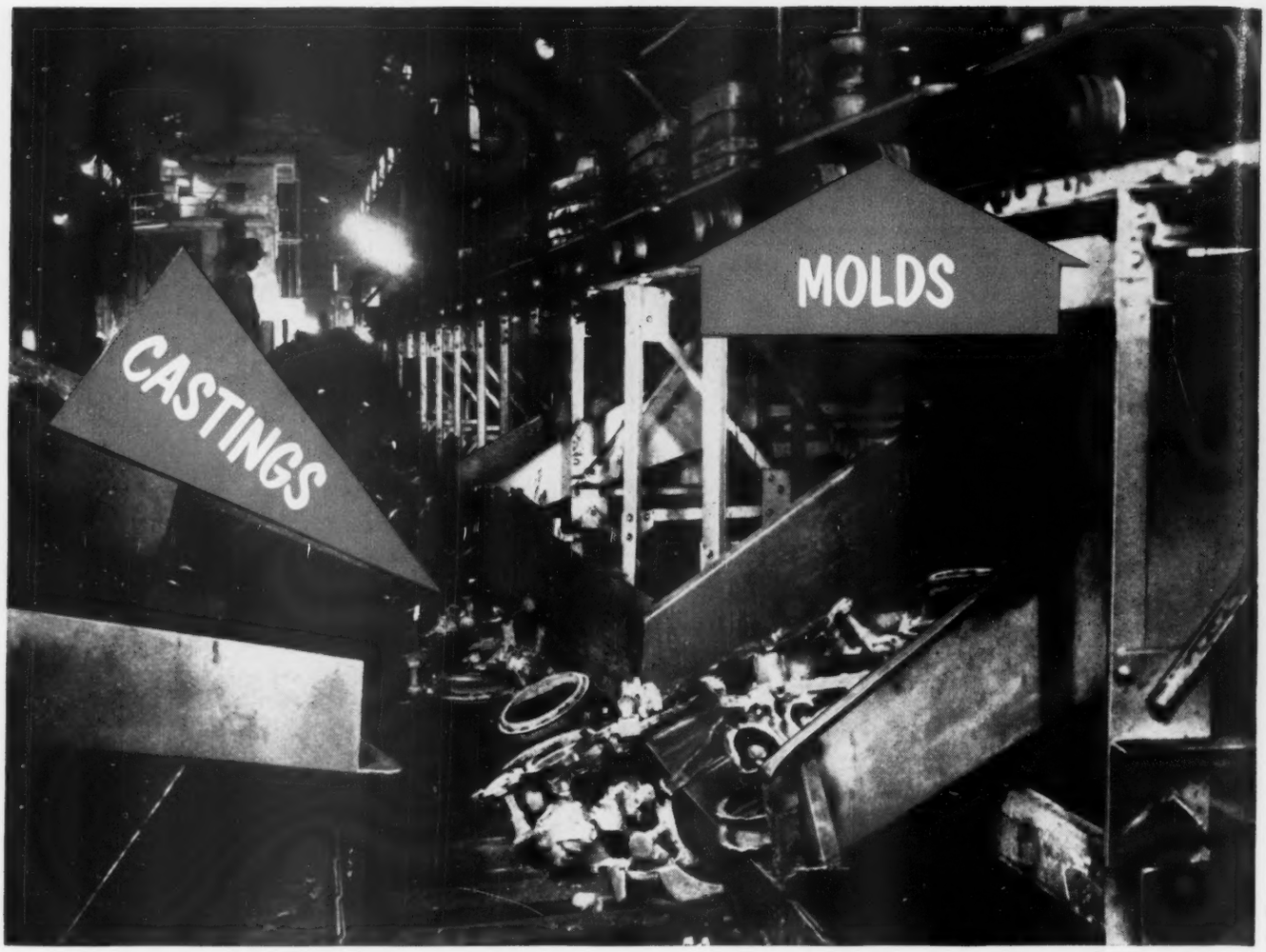
Check these advantages of Lindberg-Fisher Hydraulic Nose-Pouring Melting Furnaces

- Constant pouring arc regardless of degree of furnace tilt.
- Rate of pouring always under positive and constant finger-tip control.
- Special trunnion mounting permits lower construction than hand tilting furnace.
- Reduced height facilitates charging cold metal, and observation of metal.
- Metal waste and pouring hazard greatly reduced by closeness of ladle to pouring spout.
- Labor saving . . . simple control enables one man to pour and transfer metal.

Write for Bulletin No. 57-A for more information on MNP-Motorized Tilting and HNP-Hydraulic Tilting Constant Arc Nose-Pouring Furnaces.

LINDBERG-Fisher MELTING FURNACES

Lindberg Engineering Company, 2453 West Hubbard Street, Chicago 12, Illinois



ON THE MOVE...

The way in which Jeffrey mold and casting conveyors work together results in one of the most up-to-date methods of transportation in use in the modern foundry today. Generous in capacity, Jeffrey Mold and Casting Conveyors move right along. They characteristically do a job of cost lowering in this completely mechanized foundry.

You'll like Jeffrey Foundry equipment . . . the way each unit is engineered for the job it is to do . . . the way our engineers help you determine the best arrangement suited to your operations. It all adds up to a smooth-running system . . . more profits for you. May we hear from you?

• • •

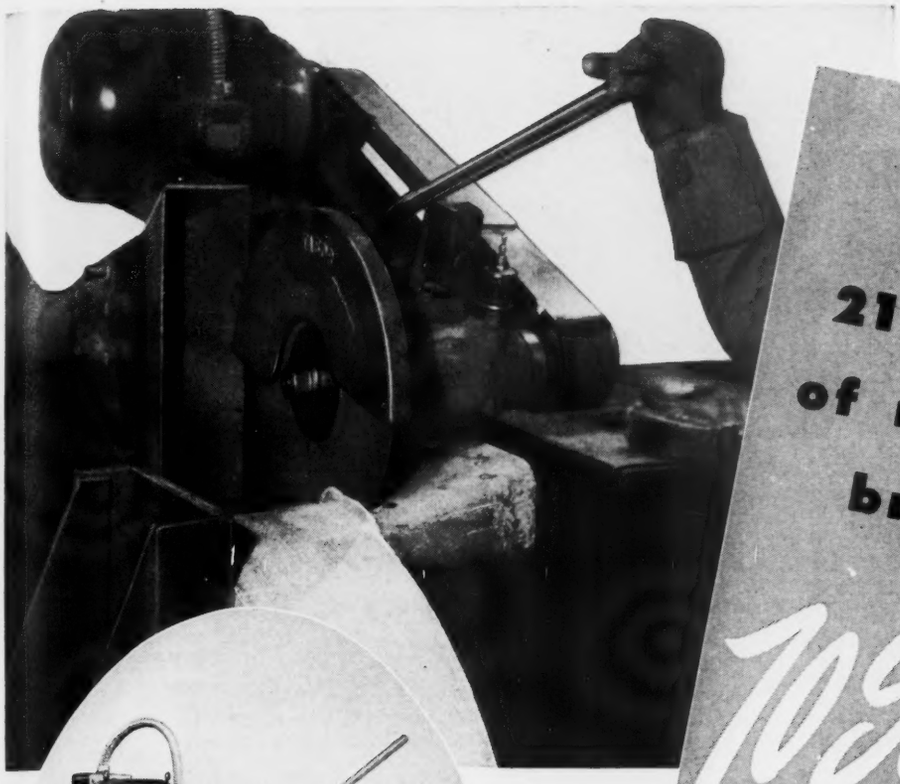
Aerators	Cleanarators	Flask Fillers
Bucket Elevators	Crushers	Paddle Mixers
Chains	Conveyors	Screens
Clamshell Valves	Disintegrators	Sanditioners
	Feeders	

THE JEFFREY MANUFACTURING COMPANY
907 North Fourth St., Columbus 16, Ohio

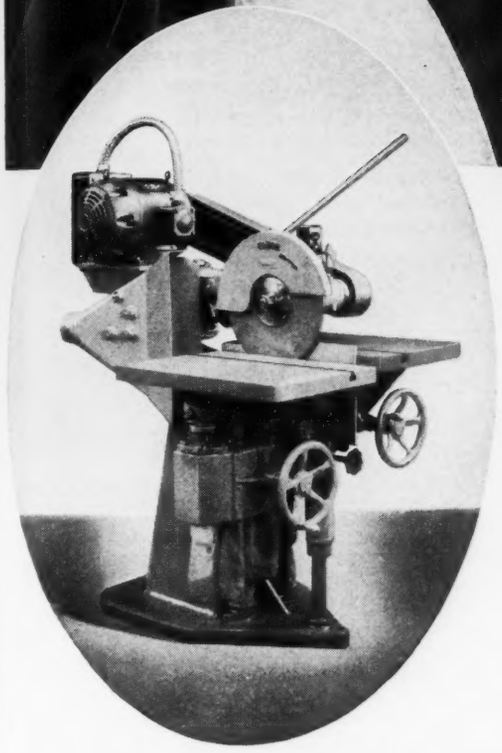
1877 75 YEARS 1952

Baltimore 2 Boston 16 Cincinnati 2 Detroit 13 Houston 2 New York 7 St. Louis 1
Beckley, W. Va. Buffalo 2 Cleveland 15 Forty Fort, Pa. Jacksonville 2 Philadelphia 3 Salt Lake City 1
Birmingham 3 Chicago 1 Denver 2 Marion, Ky. Milwaukee 2 Pittsburgh 22

Jeffrey Mfg. Co. Ltd., Montreal, Canada
British Jeffrey-Diamond Ltd., Wakefield, England
Jeffrey-Galion (Pty.) Ltd., Johannesburg, S. A.
The Galion Iron Works & Mfg. Co., Galion and Bucyrus, Ohio
Galion (Great Britain Ltd.), Wakefield, England
The Ohio Malleable Iron Co., Columbus, Ohio
The Kilbourne & Jacobs Mfg. Co., Columbus, Ohio



Through 21 sq. inches of manganese bronze in 10 Seconds!



That's a mighty fast cut for a 16" wheel driven by a 10 H.P. motor—a good example of how top-speed production schedules are "meat" for Tabor-Brasive Cut-Off Machines.

These rugged machines cut gates and risers from non-ferrous and ferrous castings in a matter of seconds. Clean, close cuts, too, that slash snagging and finish-grinding costs to the bone—often do away with them entirely.

And for the *really tough* cutting jobs—in steel foundries—in copper cutting (either gates and risers or crucible feed stock)—wherever the going's the toughest, Tabor makes a big-value 15 H.P. cut-off.

Any way you look at it, a Tabor-Brasive Cut-Off Machine—equipped with today's hard-to-break, safe-to-use wheels—is *your* answer to more cuts at less cost, with safety.
Write, wire or 'phone for more details.

SPECIFICATIONS

Motor	Table Size (Split Type)	Wheel Diam.	Max. Height of Work Under Wheel
10 H.P.	36" x 25"	16" Max. Thickness—5/32"	20" (with head over table) 46" (with head swung to side)
15 H.P. (Two Speed)	41" x 30"	20" Max. Thickness—3/16"	18" (with head over table) 44" (with head swung to side)
All motors fully enclosed, fan-cooled, ball bearing			

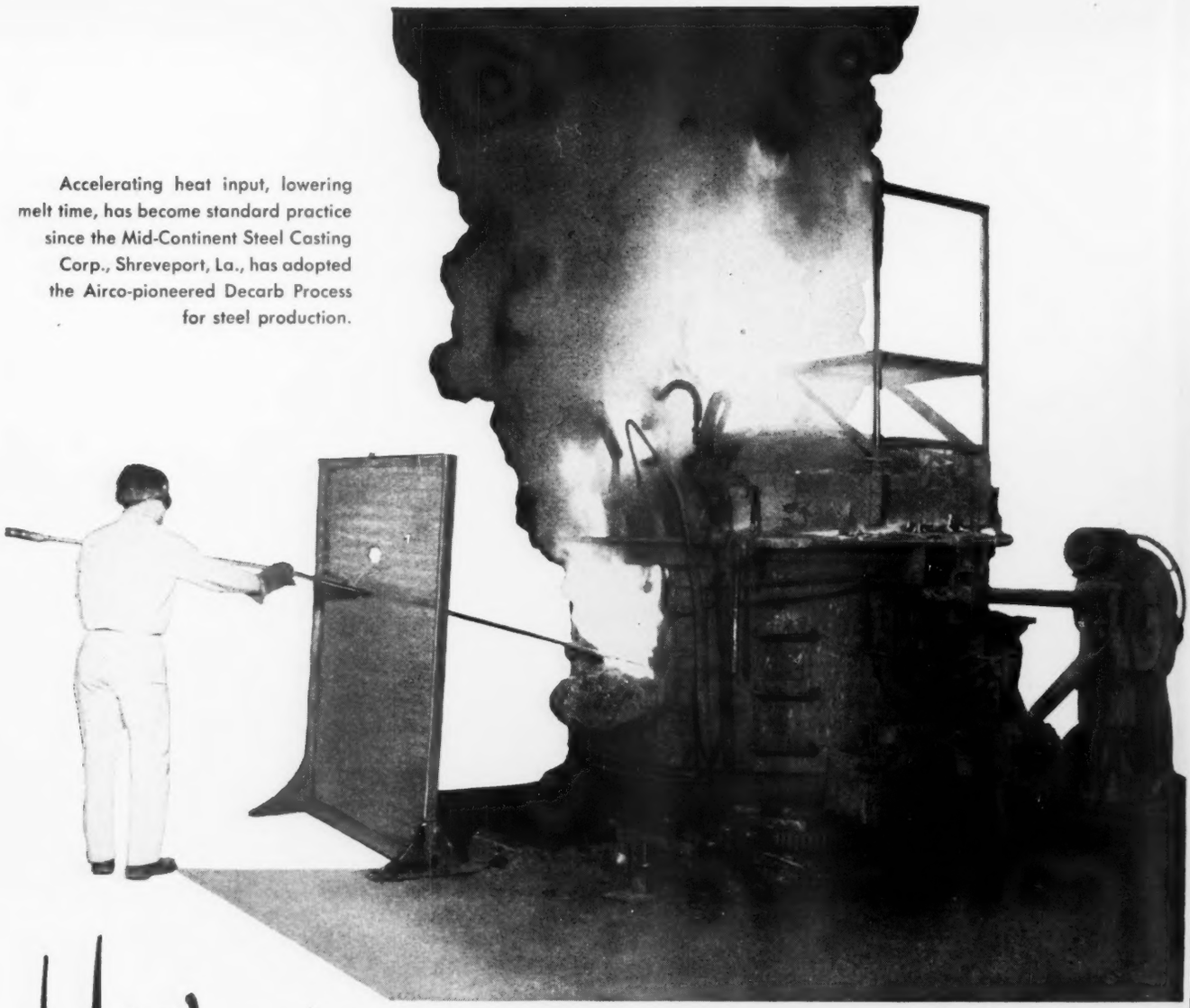
REPRESENTATIVES
Snyder Foundry Supply Company, Los Angeles, Calif.; The Pacific Graphite Company, Inc., 40th & Linden Sts., Oakland 8, Calif.; Carl F. Miller & Company, Seattle, Washington; Harry H. Reich, Trussville, Ala.

FOUNDRY EQUIPMENT MANUFACTURERS ASSOCIATION INC. MEMBER FEMA

The TABOR Manufacturing Co.

SINCE 1884 MANUFACTURERS OF FOUNDRY MOLDING MACHINES
6225 TACONY STREET • PHILADELPHIA 35, PENNA.

EXPORT DEPARTMENT, 765 DREXEL BLDG., PHILA. 6, PA.



Accelerating heat input, lowering melt time, has become standard practice since the Mid-Continent Steel Casting Corp., Shreveport, La., has adopted the Airco-pioneered Decarb Process for steel production.

How TO INCREASE STEEL PRODUCTION

use less power–save more time

WITH AIRCO'S STEEL DECARBURIZATION PROCESS

Oxygen injected under the slag cover at 80 psi has become the answer to Mid-Continent's faster steel production.

Increased bath temperature—faster carbon elimination—lower power consumption . . . time saved per heat . . . gives Mid-Continent a product with the same normal chemistry, slag control and fluidity as they formerly received using ore. Additional workflow advantages are gained by the elimination of ore handling and storage problems.

Oxygen decarburization for faster heats may be put to work for you. The facilities of our Technical Sales Division may furnish you with the answers you need to know about this process for your use. If you are interested in obtaining further information, please address your nearest Airco office.

AT THE FRONTIERS OF PROGRESS YOU'LL FIND

AN AIR REDUCTION PRODUCT

AIRCO®

DEALERS AND OFFICES IN PRINCIPAL CITIES

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REPRESENTED INTERNATIONALLY BY AIRCO COMPANY INTERNATIONAL

DIVISIONS OF AIR REDUCTION COMPANY, INCORPORATED

MELTRITE PIG IRON

Demand Reflects Value

Making MELTRITE
Pouring molten iron into moulds at the pig machines.

MORE USED THAN ANY OTHER MERCHANT PIG IRON

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69 years of service to industry

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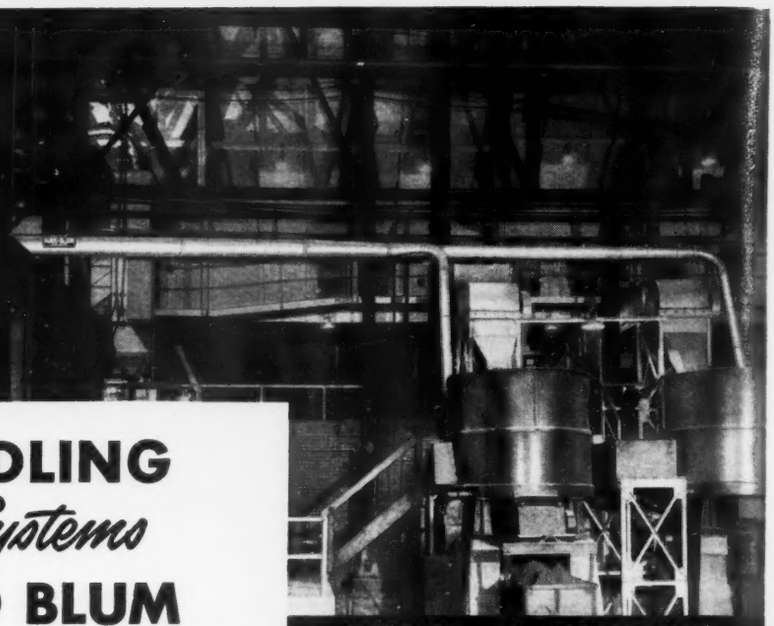
IRON ORE • PIG IRON • COAL • COKE



SAND HANDLING
Dust Control Systems
by KIRK AND BLUM

Dust is efficiently removed in the sand handling department of a large well-known steel foundry . . . as illustrated in these photos of a typical KIRK & BLUM Foundry Dust Control System.

One of many KIRK & BLUM foundry applications, this installation meets every requirement of the American Foundryman's Association code; heavy gauge piping has flanged joints and convenient clean-out doors.

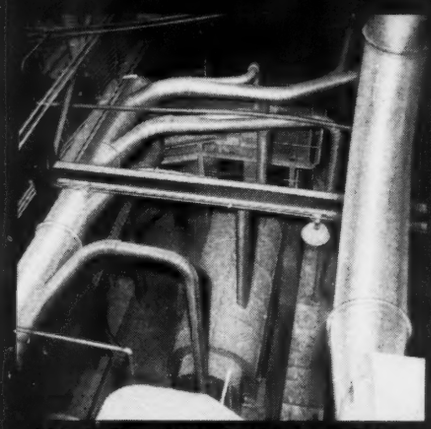
Don't let dust foul up expanding production plans. Whether you need a new dust control system . . . or more capacity in an existing one . . . contact KIRK & BLUM, specialists in dust and fume control for more than 44 years. They'll gladly prove the money-saving efficiency of KIRK & BLUM dust control systems.

For informative booklet, write: The Kirk & Blum Mfg. Company, 3108 Forrer St., Cincinnati 9, Ohio.

FOR CLEAN AIR . . . THE INVISIBLE TOOL

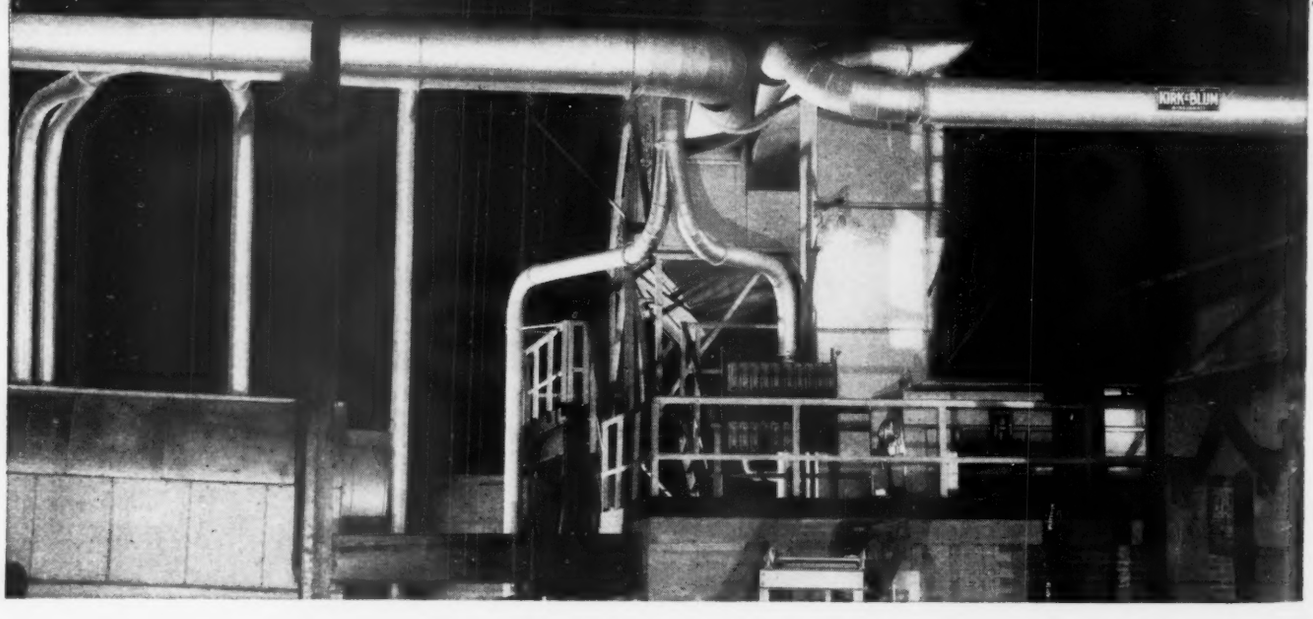
KIRK AND BLUM
DUST CONTROL SYSTEMS

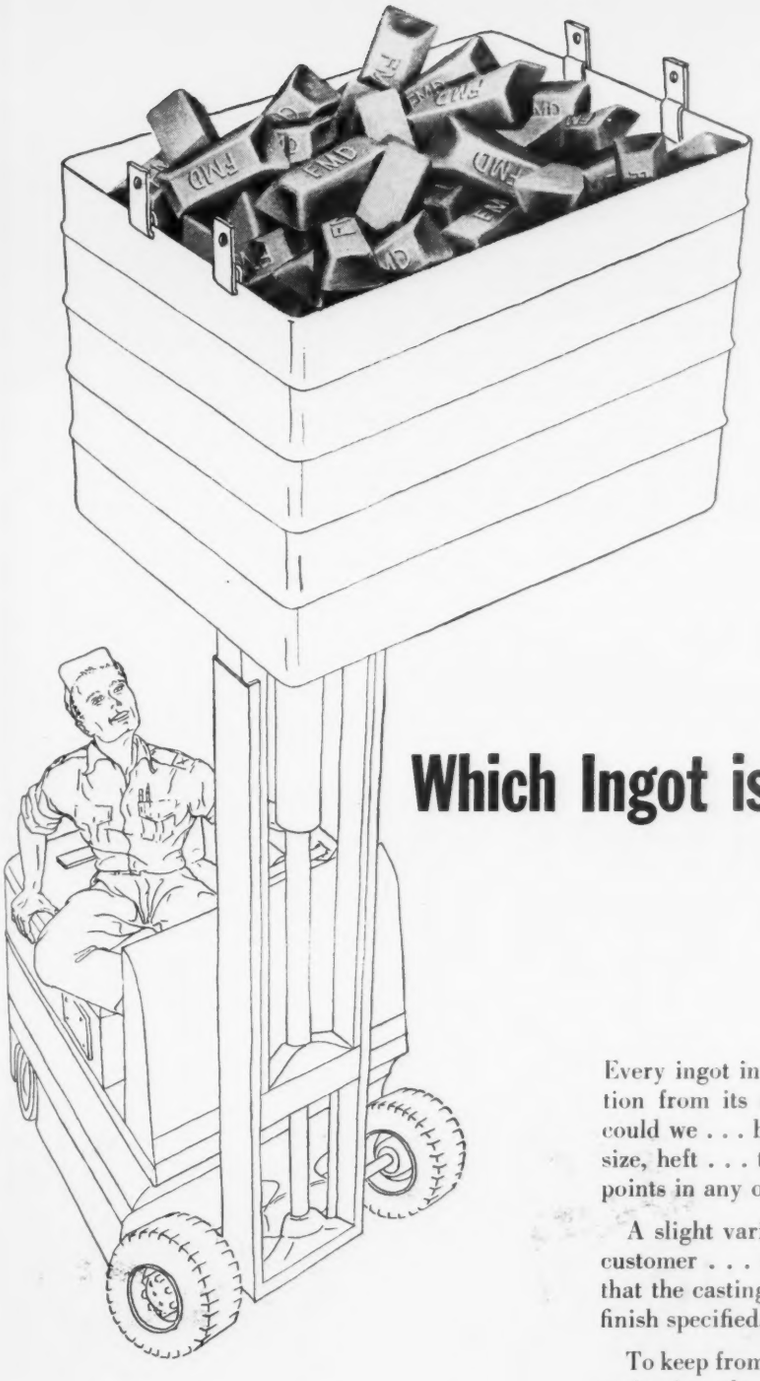
Dust Control connections to Simpson Mixers in right foreground.



Kirk & Blum Dust Control on a Rotary Breaker Screen.

View of sand handling equipment with rotary breaker screen on the left.





Which Ingot is Best for You?

Every ingot in that stack might be slightly different in composition from its neighbor. You could never tell . . . and neither could we . . . by simply looking at the lot. Color, texture, shape, size, heft . . . they would all seem alike, but might vary several points in any one of the elements.

A slight variation of ingredients could lose you an important customer . . . strain relations at the very least, when he found that the castings did not "turn up right" or "refused to take the finish specified."

To keep from losing customers . . . yours and ours . . . Federated maintains the most exacting scientific metallurgical control known in the business. You can be sure of the composition . . . to within infinitesimal fractions of a percent . . . when you use Federated products.

In these days of variable labor and material markets it pays to buy a known, trustworthy metal. Take advantage of Federated reliability and service. A call to our nearest plant or sales office, or a card to our main offices, 120 Broadway, New York 5, will bring quick help on any metal problem.

Federated Metals Division

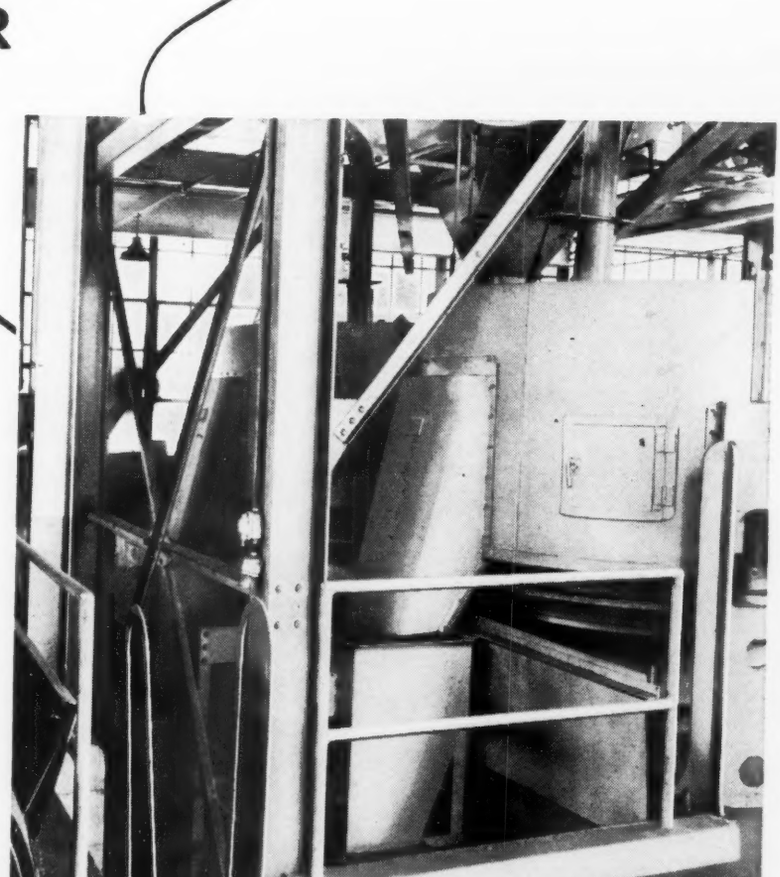
Federated first in the non ferrous field — FMD

AMERICAN SMELTING AND REFINING COMPANY • 120 BROADWAY, NEW YORK 5, N. Y.

you can make SAND PREPARATION automatic

with a

CLEARFIELD MIXER



All Clearfield Mixers can be completely controlled by electric timing devices, giving you fully automatic sand preparation. You'll save time, cut costs and assure yourself of a continuous supply of sand prepared exactly as you want it when you employ a Clearfield automatic mixer.

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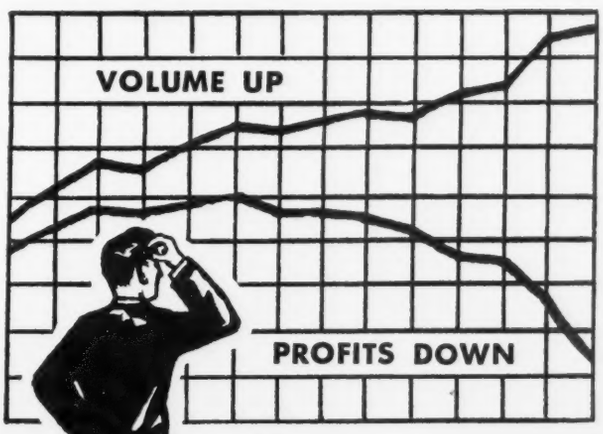

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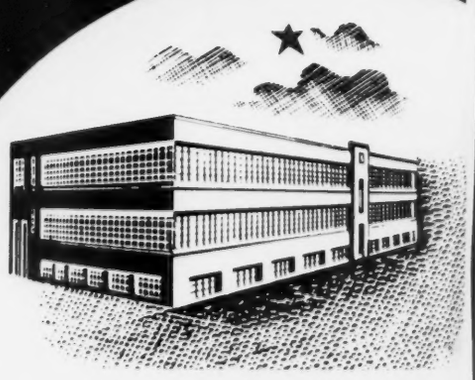

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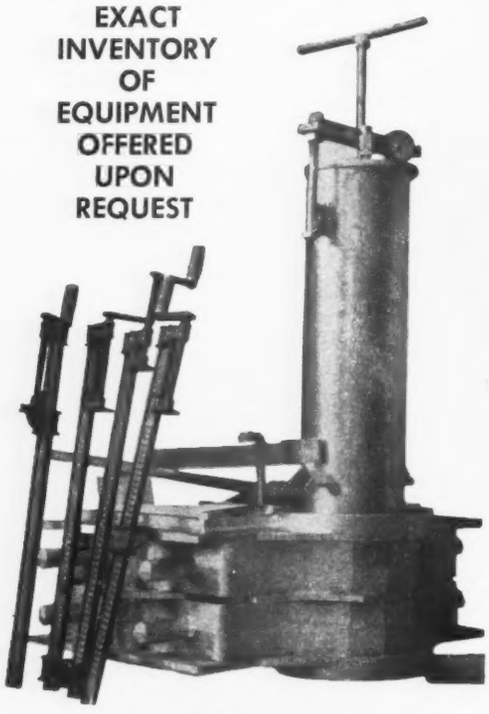

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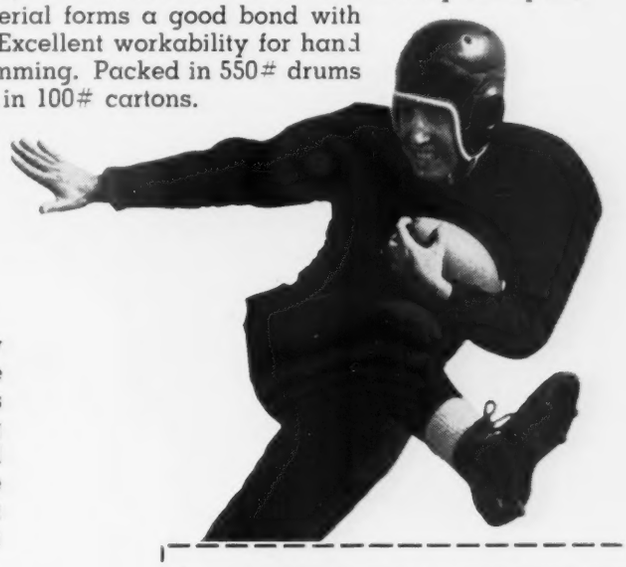

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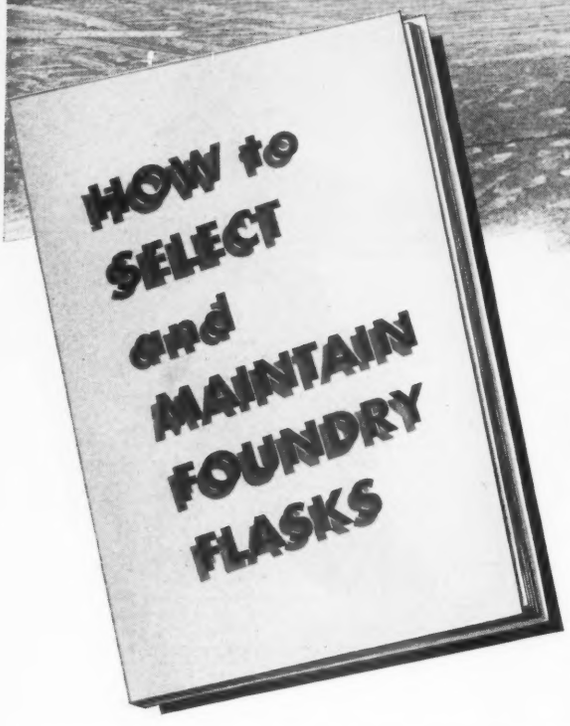

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It's Time for Action

Events of the past few months indicate that the foundry industry has become the victim of procrastination and discrimination on the part of the Office of Price Stabilization. Repeated requests for relief for the castings industry have brought forth only promises of action, and to date these have not been kept.

Late in July the steel strike was ended, and that industry was given a substantial increase in prices to compensate for higher labor costs. While the wage pattern of the foundry industry is quite different from big steel, in that contracts are negotiated throughout the year, the steel settlement did bring additional demands upon foundries for wage increases.

Since many of these demands have been met, individual foundrymen and groups immediately asked the OPS for price relief to offset these increased labor costs. The industry pointed out that, due to the high percentage of labor in the cost of producing castings, the impact of wage increases is much greater on foundries than on big steel. Furthermore, the pass-through on steel, copper and aluminum is practically worthless as far as the castings industry is concerned. While Washington has spent considerable time "going through the motions," direct action has been slow to materialize.

In considering requests for higher ceiling prices, meetings of the various foundry industry advisory committees to the OPS were deemed advisable. Instead of handling these promptly, OPS strung them out over the period from Sept. 15 to Oct. 6. Reports of these various meetings issued by OPS indicate that the committees recommended a survey be undertaken to establish that the industry is entitled to higher ceilings under the OPS earnings standard. It should be pointed out that the earnings standard basis is a dream child of OPS economists which industry does not believe is fair or satisfactory. While the committees "recommended" surveys, they did so under OPS pressure. Distribution of the questionnaires is under way but more delays can be expected in analyzing and drawing conclusions. Meanwhile, numerous companies are experiencing serious losses.

The foundry industry is made up of over 5000 firms which almost entirely come under the classification of small business. They do not have the standing with the politicians and bureaucrats enjoyed by some of their bigger brothers. But they are basic in both the civilian economy and defense activities.

Washington should realize that the companies in this industry must be healthy financially to serve the nation at this time.

Isn't it time for OPS to quit horsing around and grant the much needed higher ceilings?

Frank G. Steinbach
Editor

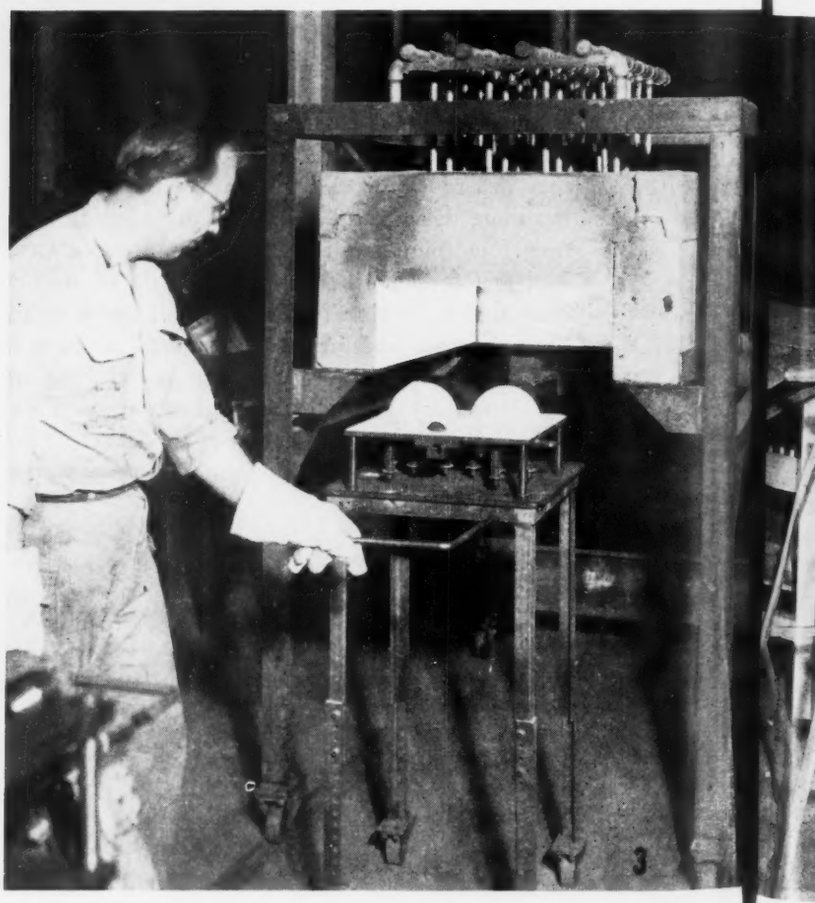
SHELL

Fig. 1—Prepared shell mold assemblies are poured off after they have been placed in flask

Fig. 2—After the metal pattern assembly has been preheated, it is placed on the sand-resin box

Fig. 3—A pattern assembly with sand-resin shell is placed under oven so that shell can be cured

Fig. 4—Stripping a cured shell



By GARNET P. PHILLIPS
General Supervisor, Foundry Research
International Harvester Co.
Chicago

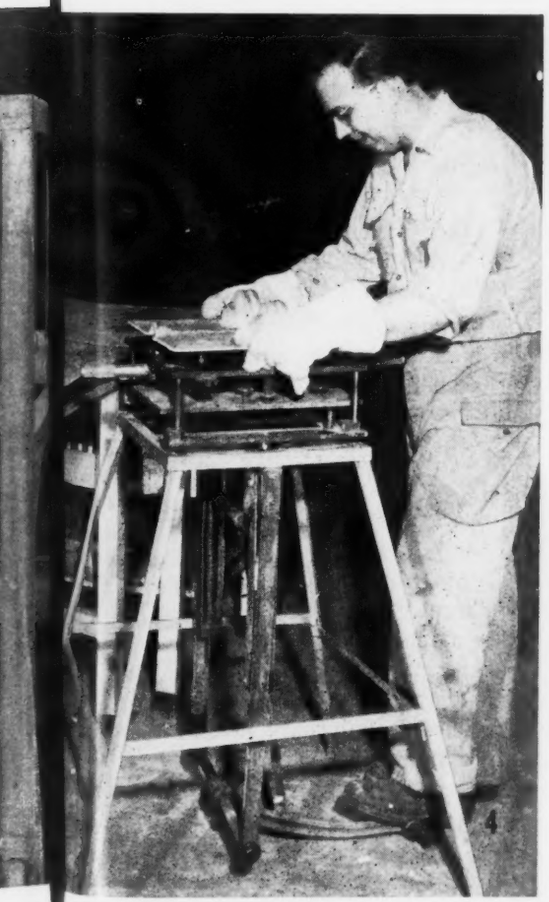
L MOLDING

At International Harvester Co.

This is the first of two articles describing shell molding development work in which the International Harvester Co. has been actively engaged the last two years at its research foundry. In addition to discussing in detail the process itself, the author outlines equipment requirements for both relatively large production setups and experimental work. The company has copyrighted the name "Contour" to apply to its shell molding process

THE Contour* molding process is a comparatively new method of producing castings with relatively fine finish and within dimensional tolerances that are much lower than are obtained by conventional green sand molding methods.

In the process heated metal patterns mounted on metal plates are covered with a mixture of fine silica sand and powdered phenol-formaldehyde resin. The dry powdered resin in the mixture in contact with the hot pattern and plate melts and forms a soft shell about $\frac{3}{16}$-in. thick. The pattern and plate are inverted to permit excess sand-resin mix to fall away. The pattern, plate and adhering shell are turned over so that the shell is on top. They are placed in an oven for a curing or baking operation, are removed from the oven, the shell is pushed off of the plate and pattern with ejector pins, cooled and assembled with another shell to form a mold, put in a flask, backed up with metal shot, grit or sand and poured off in a conventional fashion.



This new molding process has been under study by the Foundry Section of International Harvester Co.'s Manufacturing Research since 1949. In the latter part of 1950 research work on the process was actively begun in our research foundry, and since then has been carried on continuously. Some of the castings made during this time are shown in Figs. 6, 7, 11, 15.

On smaller sized castings, which may be classed as squeezer work, the dimensional tolerances that can be held are in the range of 0.002 to 0.003 inch per inch of dimension. On larger, more complex castings the dimensional tolerances may be larger. This close dimensional tolerance, plus relatively fine finish, lead to the following advantages of Contour molded castings compared with conventional green sand molded castings:

1. Less metal required per mold of up to 30 per cent.
2. Less finish stock required on castings of up to 70 per cent.
3. Less metal in castings of up to 18 per cent.
4. Less metal in sprue and gates of up to about 45 per cent.
5. Molding labor as such is eliminated. Shell ma-

* Copyright 1952 by International Harvester Co.

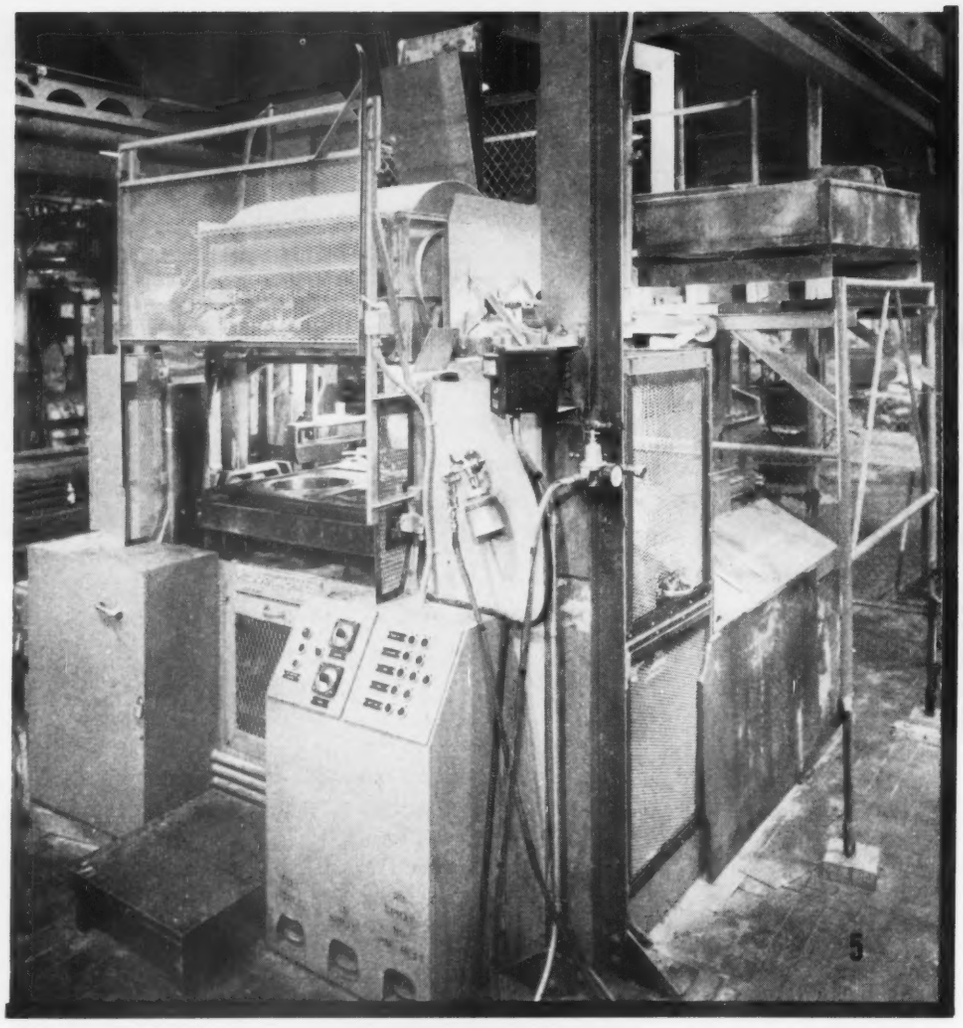


Fig. 5—View of single station machine shows control panel, pattern, safety gate

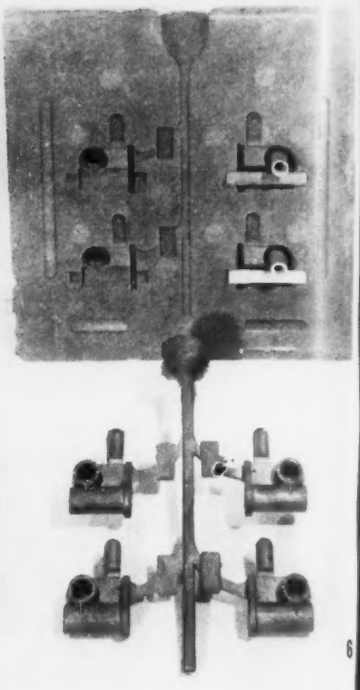


Fig. 6—Shell, 15 x 16 in., for rocker arm shaft bracket, with cores and castings

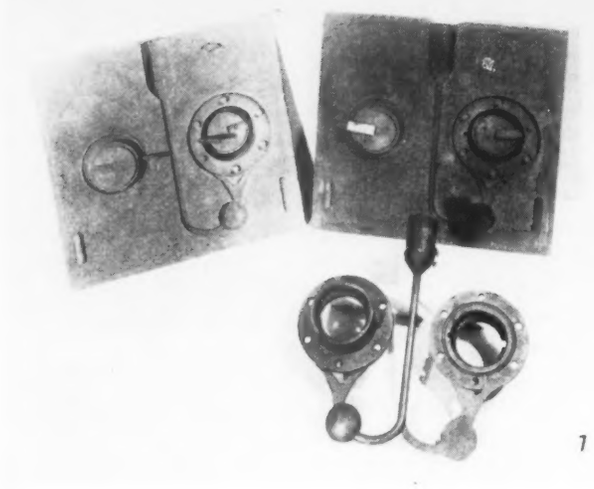


Fig. 7—Identical, symmetrical shells, 15 x 16 in., for pinion bearing cage, with cores and castings

chine operators replace conventional molders.

6. Cleaning of castings is simplified and cleaning and other labor reduced up to about 10 per cent.

7. Machining labor using current tools is reduced, due to less metal to be machined off, up to about 25 per cent.

8. Reproduction of pattern detail is brought out to a high degree. Milling marks on patterns are brought out clearly when sufficiently fine sand is used.

9. Skilled molding labor is not required as unskilled labor can be quickly taught to perform necessary operations.

10. Less floor space or molding unit space is required due to relatively smaller size of molds and due in many cases to pouring in a vertical position.

11. Scrap losses caused by chilled edges and gas inclusions due to moisture are eliminated as there is no moisture in the shells.

12. Baked shells or assembled shell molds can be stored indefinitely with no deterioration due to moisture absorption.

13. Shell molding is essentially cleaner than conventional green sand molding.

14. Because of the absence of moisture in shell molds there is apparently no appreciable "skin" effect, resulting in better machinability with a given metal. A very light "skin" cut may be made on Contour castings with no detrimental effects on tool life. Quantitative data on this point are meager and are being developed by Manufacturing Research.

In addition, the baked shells are very permeable, permitting the rapid escape of gas due to burning resin when molds are poured.

While molding sand preparation and handling are

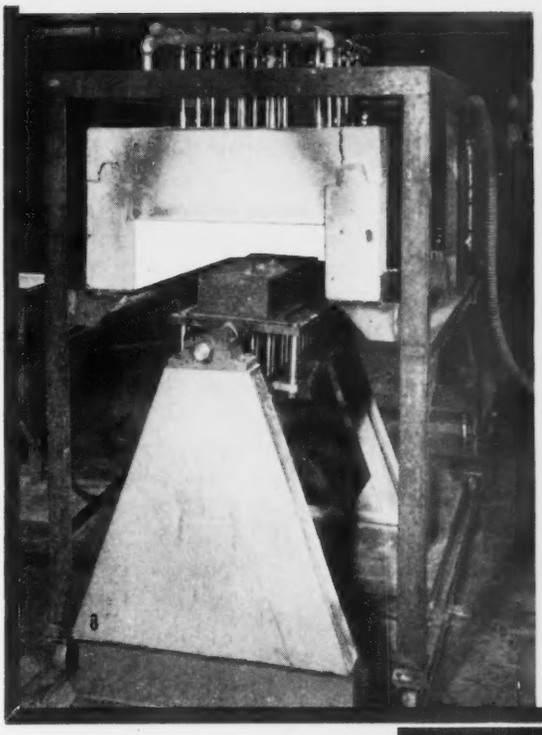


Fig. 8—Gas-fired oven over pattern assembly preheats a pattern in the fashion shown here

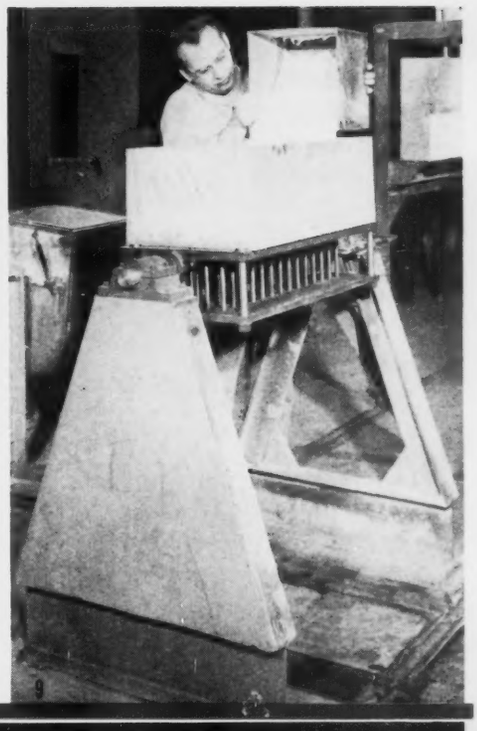


Fig. 9—The sand-resin mixture is applied to the heated pattern by hand. Wooden frame on the pattern assembly is used to hold the sand mixture during the coating period

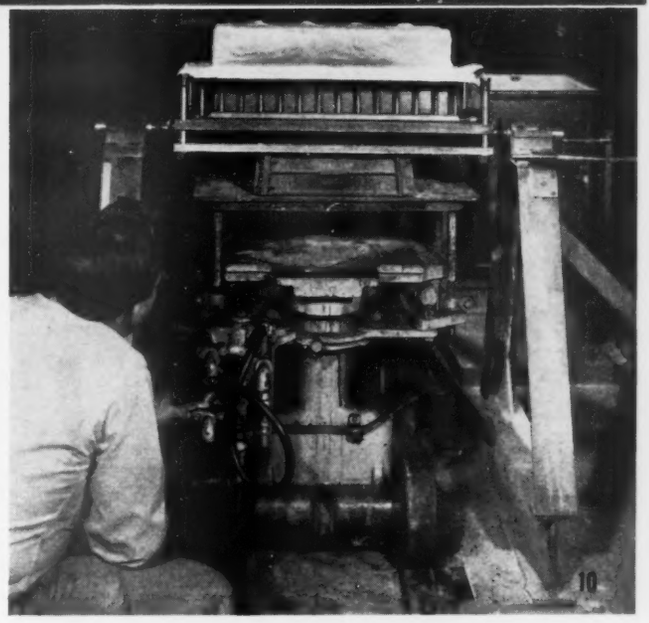


Fig. 10—Pin lift molding machine which actuates ejector pins is used to remove the cured shells

eliminated, the mixing and handling of sand resin plus the handling and cleaning of "back-up" material (shot, grit or sand) offsets this factor.

Shells require no reinforcing wires or rods, thus eliminating their cost plus cost and problem of removal from interior of castings.

Pattern Assembly—The assembly of metal patterns, plate, ejector pins and ejector plate is called a "thermodie" in IH usage. The name signifies that the metal pattern must be made with the accuracy used in die making and is subjected to heat in use.

It cannot be overemphasized that the dimensional accuracy of the patterns must be as good or better than expected in the castings. Likewise, the surface finish of the patterns must be of a fairly high degree of smoothness.

The pattern may be constructed of a number of materials. Generally, a metal is preferred whose surface will retain a very smooth finish, whose melting point is fairly high and will not undergo sharp changes in physical dimensions with temperature changes. Aluminum and other soft metals should be avoided if possible except for experimental patterns where such metals may be more economical to cast and easier to modify. It is also unwise to use two dissimilar metals on a single pattern, as stresses and strains caused by uneven expansion and contraction with heat are undesirable. Machined cast iron is quite suitable. This fact permits the machining of rough gray iron sand castings for use as patterns in many cases. As it is contemplated that many of the castings to be made by the new process are currently manufactured by conventional methods and that sand castings are thus obtainable, this use of castings for patterns may play an important part in the consideration of conversion costs. Steel is satisfactory. Beryllium-copper alloy is very good but more expensive.

Recent developments in the plastics field indicate that glass fiber reinforced plastics that will stand temperatures of up to 500° F or more may become practical and available for pattern use in the Contour process for a limited number of experimental castings or for short-run production.

Generally speaking, gates and risers are smaller than those needed in sand casting. On particular jobs, experience will dictate the need for risers and flowoffs. However, there have been few occasions in our experience with small castings where such risers were absolutely required. Shrinks which have occurred have been eliminated by gating or changes

and flowoffs. It is advisable to arrange the gating so that the molten metal feeds from the bottom of the casting. Splashing and turbulence of metal entering the mold cavity should be avoided.

If a given casting is symmetrical only one thermodie is necessary to carry on experimental work on it, i.e. the "cope" and "drag" shells, or the right and left shells if the mold is vertical, are identical. In production setups two patterns may be mounted on one plate on a machine so that both cope and drag, or right and left, shells are produced simultaneously during each cycle. Thus a machine with a 26 x 41-in. plate might have the plate divided off to produce two or four shells per cycle.

The pattern designer need not be limited to the familiar "cope" and "drag" but may consider three or more sections for a complicated mold. Matchplates are set into the pattern plate so that an exact fit occurs. Cores with large prints may be used to properly align the shells; on the whole this is preferred (if cores are used) because a slight warping is less harmful if the actual reproducing portion of the shell is correctly located in place. Otherwise locators of button or slot design may be incorporated on pattern plate to properly align shells on assembly into molds.

The plate on which the actual pattern is mounted is limited in size by the manner in which the molds are to be made. If a shell molding machine is available, the size of the frame opening at which the pattern plates are mounted of course determines the size and shape of the pattern plate. If the various operations involved are to be performed manually, as in preliminary experimental work, the weight is an important consideration, for the complete pattern must be light enough to be handled easily. If a dump box is used, its dimensions determine the largest size plate which can be employed (an adapter plate may be fitted over the dump box for smaller plates). A plate thickness of approximately ½-in. is advisable for small-sized thermodies and, if it is possible to hollow out projections on the pattern, this should be done. If a uniform thickness of the pattern is thus obtained the operator can be assured of an evenly cured shell. It is advisable that the pattern

Fig. 11—Crankshaft pulley shells, showing cores and castings with gating

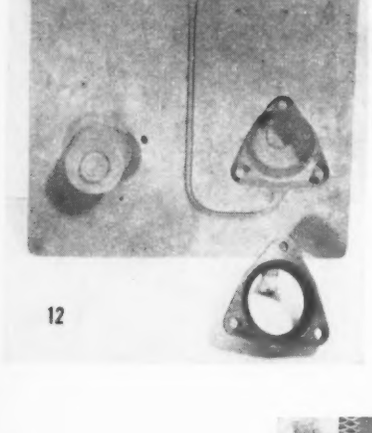
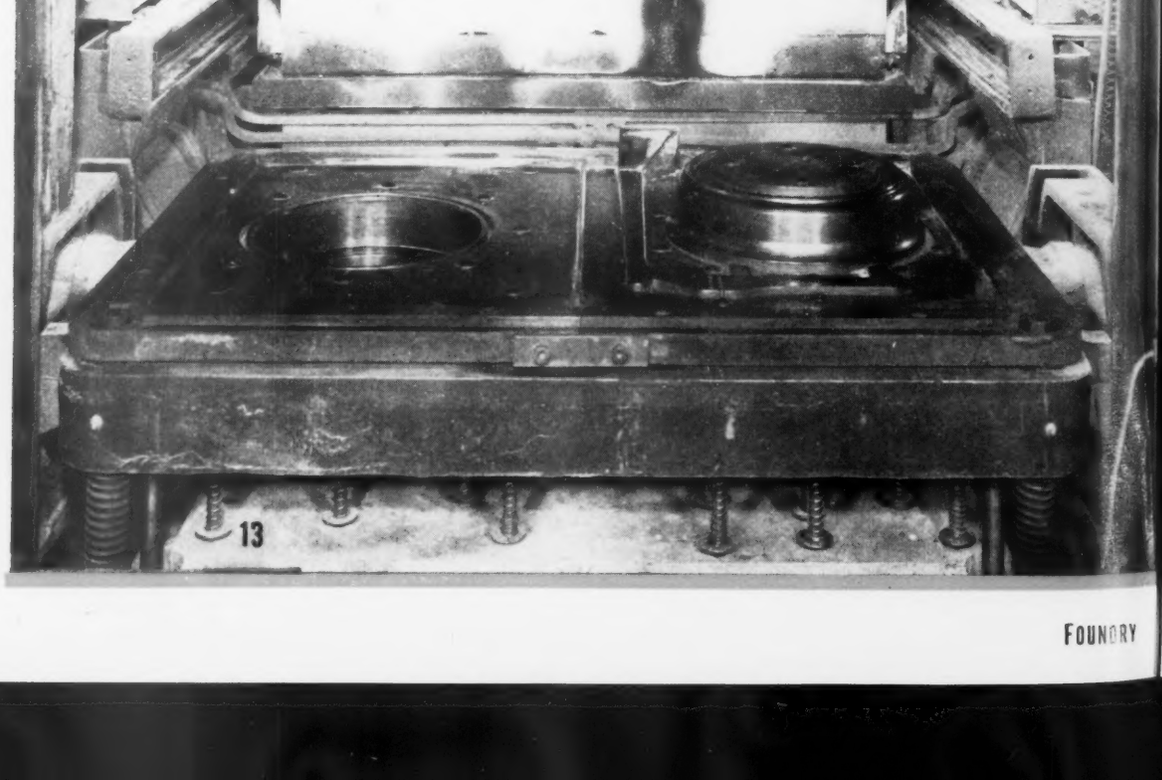


Fig. 12—Symmetrical exhaust pipe flange shell made with a dump box

Fig. 13—Brake drum pattern assemblies are mounted on adapter plate of shell making machine. Heads of ejector pins resemble buttons on pattern plate



and pattern plate be constructed of the same material.

For production work it is necessary that a contrivance be used to permit easy removal of the finished shell from the plate. This is best installed in the plate itself. A further discussion of devices used appears elsewhere in this report.

Cores can be made by the Contour process through the use of the dump box method or by blowing. At the time of writing our experience with shell cores has been limited to relatively simple, small shapes. It is preferred that patterns be designed so that there will be as few cores needed as possible. Keeping in mind that coreboxes must be heated, boxes for complex cores with multiple draws which require loose pieces should be constructed so that the drawing of the loose pieces can be done mechanically rather than manually. Because it is desired to make hollow shell cores it is necessary to provide ample openings in the form of core prints to permit removal of excess sand-resin mix. To our knowledge no shell core making machines have been developed to date. It is feasible for conventional cores, either liquid resin or oil bonded, to be used in shell molds.

Certain metal core boxes and patterns used in existing production work may be converted for use in shell molding, but care should be taken in the selection that no solder or other low-melting-point material has been used for earlier repair.

Preparation of Thermodie — A commercial coating material is being successfully used as a coating on new thermodies. The material applied in a thin coating over the pattern improves the finish of machined surfaces and provides a smooth film on rougher surfaces. The preparation may be applied with brush or cloth. This is done while the pattern is cool and for best results is immediately baked in.

A liquid release agent is generally employed to permit easy removal of the shell from the pattern. A dilute solution of silicone mold release fluid is most suitable. The liquid release can be sprayed on the hot pattern and plate or a dumping of the hot thermodie into a tank containing the release solution will readily fit into the cycle.

After a thermodie has been in use for some time, an accumulation of foreign material may be observed, especially at corners and small openings. Careful scraping with a wide-edge hard wood scraper and a vigorous rubbing with a soft cloth or medium stiff brush is the best known cleaning method to date. A motorized brush is coming into use for cleaning. This cleaning is essential to maintain the dimensions of the pattern.

Sand and Resin—A considerable variety of sands and resins has been used in our experimental molding and evidently each mix has features of its own. It is not possible to predict qualities of a mix when a familiar sand and resin (*Please turn to page* 282)

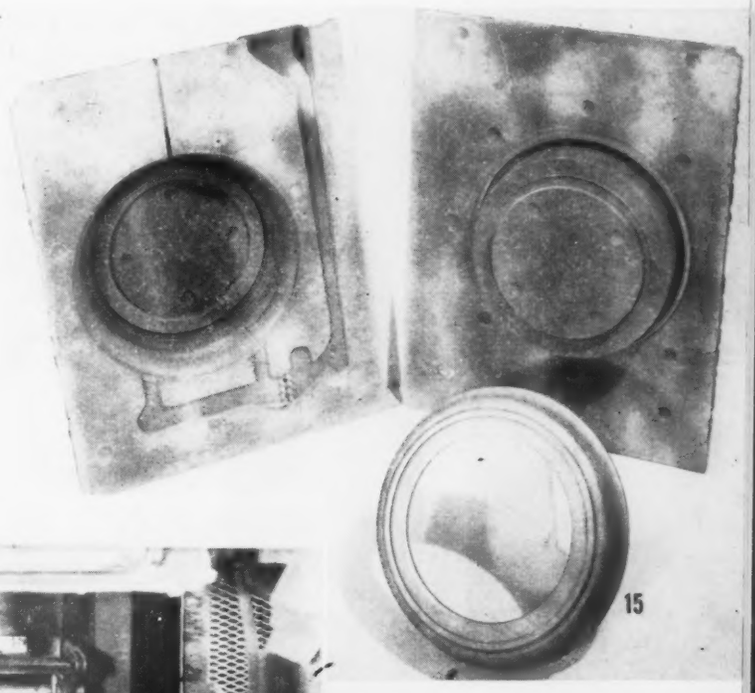


Fig. 15—"Cope and drag" shells, 20.5 x 26 in., for truck front wheel brake drum, with casting

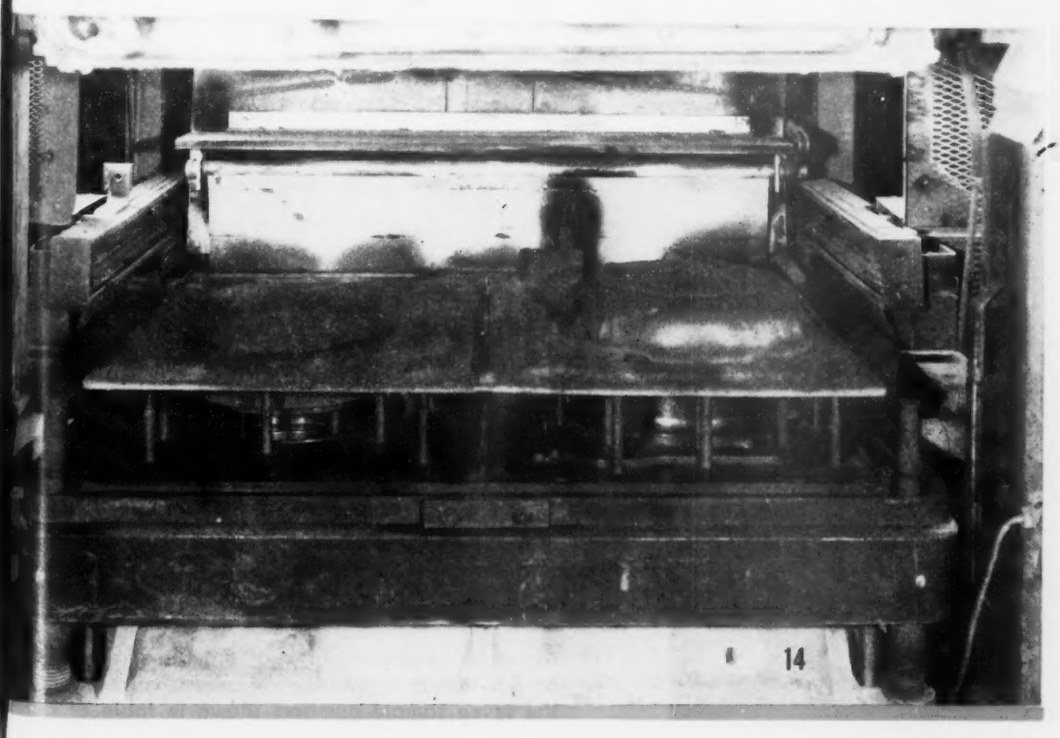
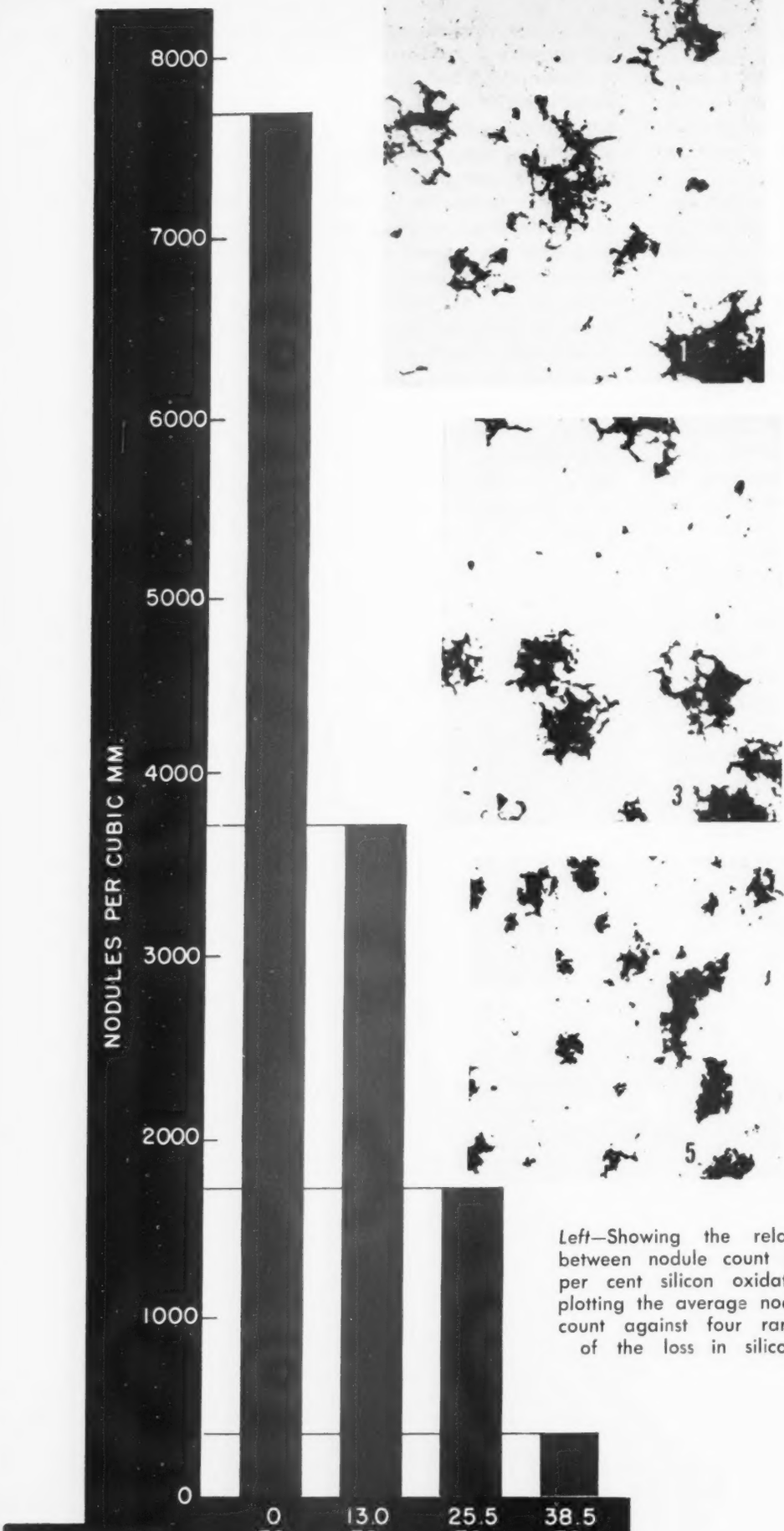


Fig. 14—Brake drum shells, lifted from pattern, are resting on ejector pin heads



Left—Showing the relation between nodule count and per cent silicon oxidation, plotting the average nodule count against four ranges of the loss in silicon

Above—Micrographs of cupola test samples taken at five-minute intervals. Numbers correspond to the seven sample numbers shown in table at right

CUPOLA METAL TESTS

EFFECT OF OXIDATION RATES

on Graphitization of Cupola Melted Malleable

The author's study indicates that oxidation during cupola melting strongly affects graphitization rate, and number and form of nodules in malleable iron. This paper was presented at the 1952 AFS Ohio Regional Foundry Conference

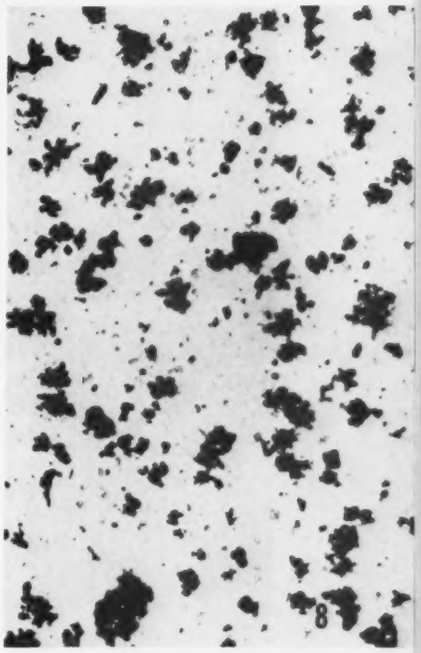
By MILTON TILLEY
Metallurgist
National Malleable & Steel Castings Co.
Cleveland

THIS paper is in the way of a progress report on one presented by the author in FOUNDRY, May, 1950. In that paper it was pointed out that the graphitizing rate, as measured by the number of carbon nodules per cubic millimeter, of the holding furnace iron was influenced tremendously by the rate of oxidation during melting in the cupola. The nodule count was in inverse proportion to the oxidation rate as measured by the loss in silicon. The average range was shown to be from 4000 nodules at 5 per cent loss in silicon to 500 nodules at 35 per cent. In the latter case the iron would be laden with pearlite using a standard annealing cycle—in this case a 6° per hour cool through the critical range.

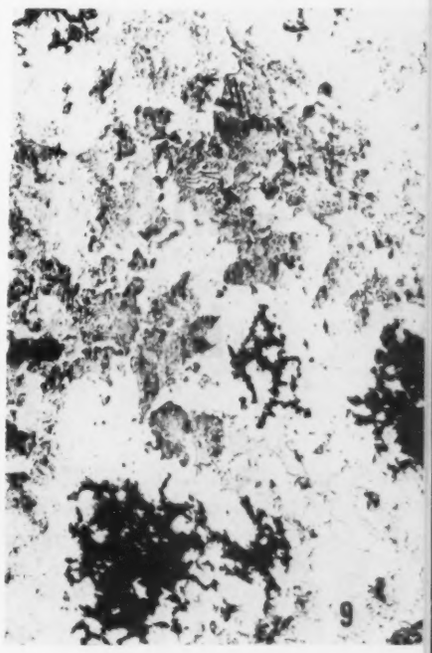
Early this year it was decided to investigate the cupola metal, as it was melted and before being mixed and further refined in the holding furnace, by pouring samples at the cupola spout. The cupola is lined to 84 inches ID, charged with 12,000-lb charges and operated at an average rate of 30 tons per hour. The 12,000-lb charge takes 12 minutes to melt. The cupola sump holds about 1000 lb of melted metal so that at any one time a test sample represents but one-twelfth of a given charge. Normally, the charge consists of 10 per cent foundry pig, 6 per cent silvery pig, 56 per cent returns and 28 per cent steel scrap, charged in the reverse order.

During the investigation 128 samples were poured during 20 operating days. The samples were annealed in a standard heat cycle, photomicrographs made at 100 X, and nodules counted. Analyses for carbon, silicon and manganese were made on each test in the hard iron state. The accompanying chart, "Cupola Metal Tests," shows the relation between nodule count and per cent oxidation of the silicon, plotting the average nodule count against four ranges of silicon loss.

In the early exploratory stage of the investigation, samples were poured at arbitrarily chosen times. Later they were poured according to the melting conditions as revealed mainly by the kind and number of sparks thrown off by the molten metal at the spout and finally at (*Please turn to page* 160)



Figs. 8-9—Extreme examples of variation in nodule content in two samples poured three hours apart



Analysis of Test Samples Poured

SAMPLE NO.*		C	Si	NODULES	REMARKS
—	1:00 p.m. Air furnace metal	2.46	1.21	2700	Normal
—	1:30 p.m. Air furnace metal	2.43	1.27	No sample	
1	1:30 p.m. Cupola test metal	2.12	0.93	350	Pearlitic
2	1:35 p.m. Cupola test metal	2.51	1.31	4100	Super normal
3	1:40 p.m. Cupola test metal	2.40	0.85	300	Pearlitic
4	1:45 p.m. Cupola test metal	2.37	1.07	1800	Subnormal
5	1:50 p.m. Cupola test metal	2.60	1.22	4200	Super normal
6	1:55 p.m. Cupola test metal	2.46	1.27	2450	Normal
7	2:00 p.m. Cupola test metal	2.27	0.99	300	Pearlitic
—	2:00 p.m. Air furnace metal	2.43	1.19	No sample	

See micrographs of corresponding numbers on opposite page.

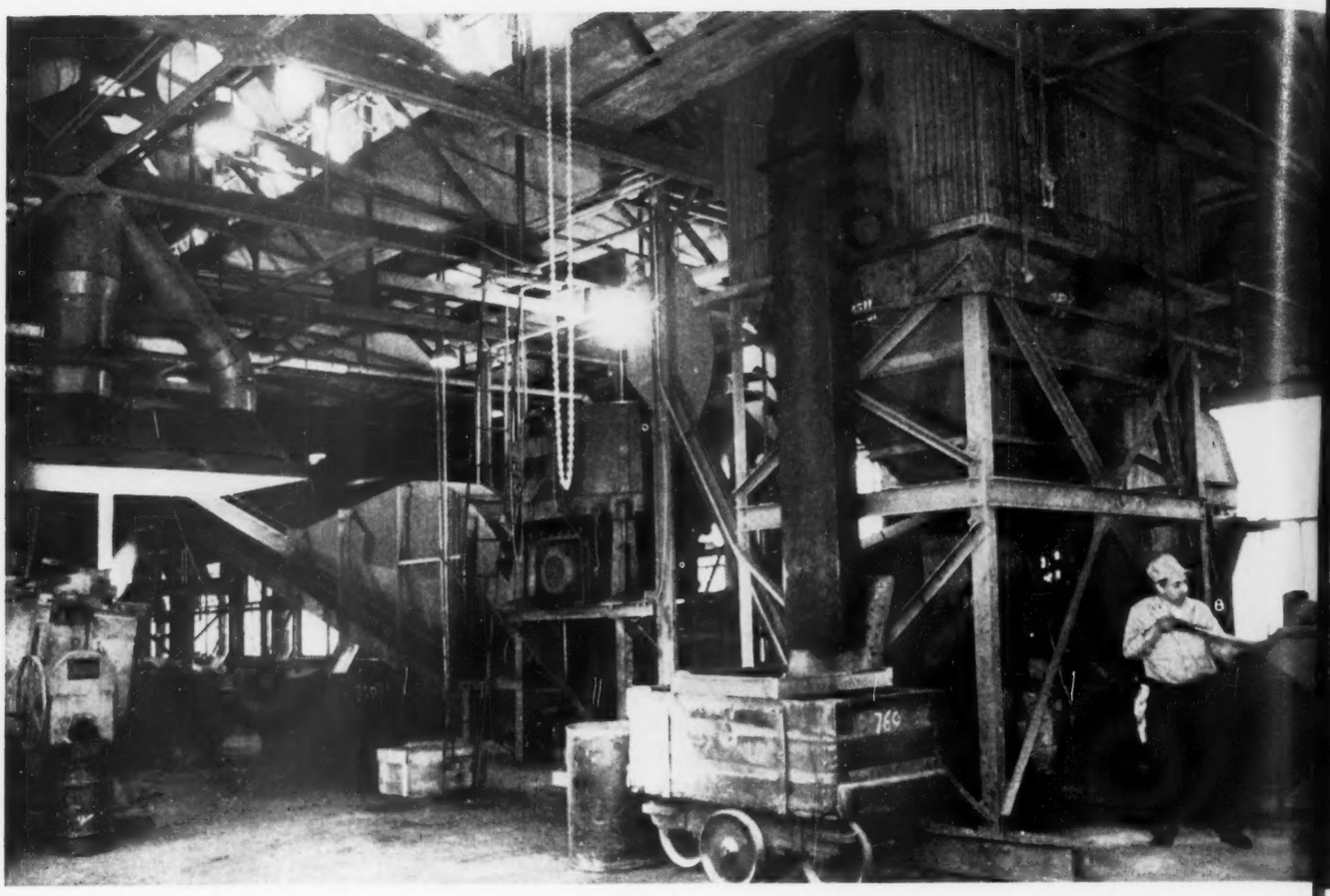


Fig. 1—Sand from shakeout and new sand are dumped into muller by skip hoist. Core lumps and foreign material are screened from shakeout sand before reuse

MANUAL HANDLING MINIMIZED

in Sixth-Floor Brass Foundry

BY APPLYING modern concepts of layout to the overall flow of foundry materials, and by adopting the most recent techniques in handling sand, flasks, and castings, the Waterbury Mfg. Co., a Division of Chase Brass & Copper Co. Inc., Waterbury, Conn., achieves these major improvements in operating its sixth-floor brass foundry:

1. Consolidates foundry operations into one 40 x 160-ft room. Previously, operations were carried out in two adjacent rooms. Empty room now is available for other manufacturing processes.

2. Provides capacity for increased production of elbows, tees and other brass foundry products. Up to 24,000 pounds of castings can be produced per day. This is in addition to the space saving advantage.

3. Enables all castings to be produced by one integrated system. Previously, different methods were used in each of the two foundry rooms.

4. Eliminates virtually all manual handling of sand, molds and castings.

5. Produces better castings.

6. Improves working conditions.

7. Reduces maintenance costs.

8. Cuts overall production time.

Under the old system, all sand was shoveled by hand, castings were transported manually, different flask sizes were used in each foundry room, and some types of equipment were subject to high maintenance costs.

To overcome these and other shortcomings and to gain the advantages listed above, a new system (Fig. 4) was designed and installed. The system was engineered by the Gifford-Wood Co., Hudson, N. Y., and the materials handling equipment was manufactured

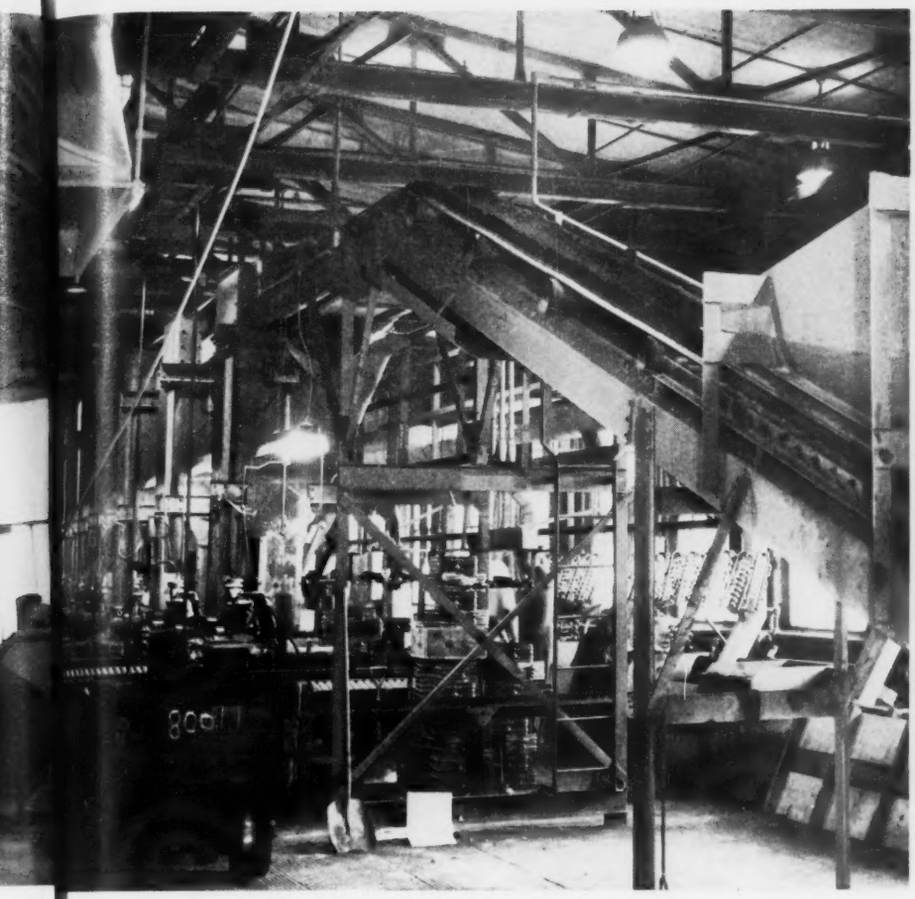


Fig. 2—Mulled sand travels through aerator to belt conveyor for delivery to molders' hoppers

Fig. 3—Sand is mixed and brought to molders without manual labor. Conveyors flank molding stations

and installed in the plant by this company.

The overall system can be broken down into three major components: (1) equipment for handling sand, (2) equipment for handling molds, and (3) equipment for handling castings.

Molding sand is handled on a 20-in-wide belt conveyor, a 12-in. screw conveyor, an 18-in. shakeout conveyor, a bucket elevator and a skip hoist. Molds are handled on roller conveyors. Gates of castings travel on a moving overhead conveyor. Molten metal is pushed from furnace through pouring stations along a monorail system. Furnaces are located in the unoccupied area shown in the plan view of Fig. 4.

Sand returns from shakeout to the 18-ton bin shown in Fig. 1. This bin empties into a 15-cu-ft skip-hoist container into which new sand also is added.

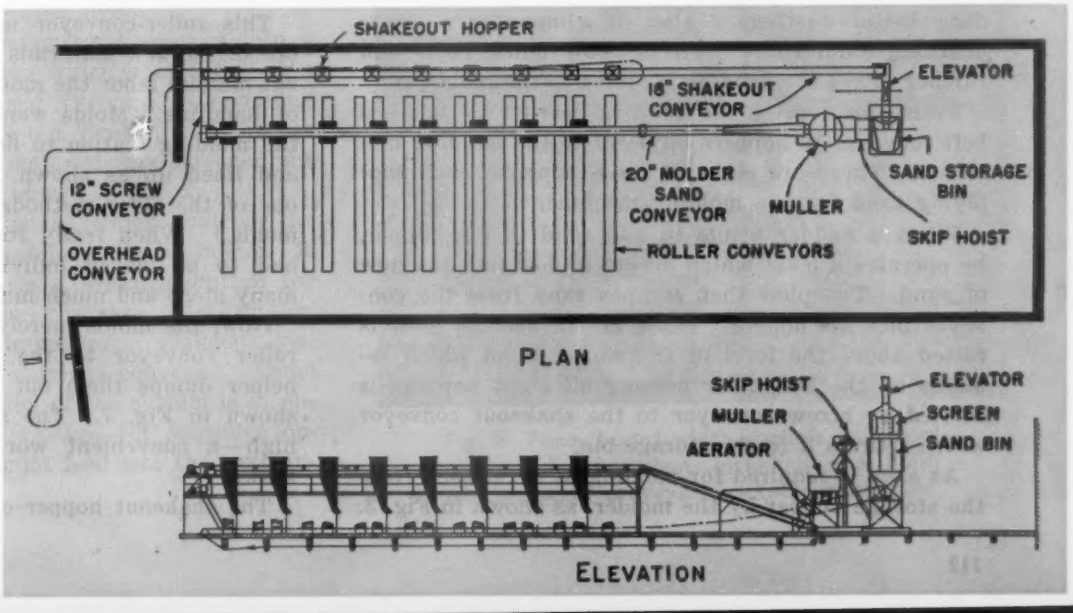


Fig. 4—Showing layout of the system for mechanical handling of sand, flasks and castings at the Waterbury Mfg. Co. foundry, Waterbury, Conn.

OLD Fig. 5—In former method of handling, the molds were poured in this manner. Flasks later were moved manually for shaking out

NEW Fig. 6—Under present system, flasks are pushed along roller conveyor for pouring, then pushed back to the shakeout station

The skip-hoist is semi-automatic and raises, dumps, and returns for the next load when the button is pushed. New sand is added from dump carts as shown in Fig. 1. This is the only point at which sand is handled manually.

The container is elevated and dumped into the muller, which mixes the old and new sand, adds moisture, and delivers the mixture to an aerator. The muller, of course, mixes and moistens the sand far better than the old shovel method and helps to produce better castings. Also, it eliminates a back-breaking hand chore. The aerator fluffs, cools and further mixes the sand as it starts to the molders.

From the aerator the sand is carried by inclined belt conveyor to hoppers adjacent to the molding machines. There are eight of these hoppers, each supplying sand for one molding machine.

When a molder wants to add sand to his hopper, he operates a lever which lowers a plow into the flow of sand. The plow then scrapes sand from the conveyor into his hopper. When not in use the plow is raised above the level of the sand. Sand which remains on the belt after passing all eight hoppers is carried by screw conveyor to the shakeout conveyor which returns it to the storage bin.

As sand is required for molding, it is released from the storage hopper by the molder, as shown in Fig. 3. The molder performs all the operations required to prepare a mold for pouring without leaving his molding station.

When a flask is ready for pouring, the molder places it on one of two conveyors which flank each molder's station. Each pair of roller conveyors (eight pairs in all) is serviced from a center platform. When a roller conveyor has a full line of molds ready for pouring, the molds are poured off from a center platform, as shown in Fig. 6.

This roller-conveyor method of handling flasks is one of the new materials handling methods which has cut manual labor the most. Fig. 5 shows the old way of handling. Molds were taken one at a time from the molding station to floor-mounted channel lengths and lined up as shown in the illustration. (Under one of the older methods the molder poured his own molds.) When ready for shakeout, the flasks again had to be moved individually—a process requiring many steps and much muscle.

Now, the molds merely are pushed back along the roller conveyor to the molding machine, where a helper dumps them out over a shakeout hopper, as shown in Fig. 7. The shakeout hoppers are waist-high—a convenient work height for emptying the flasks.

The shakeout hopper empties sand onto the shake-

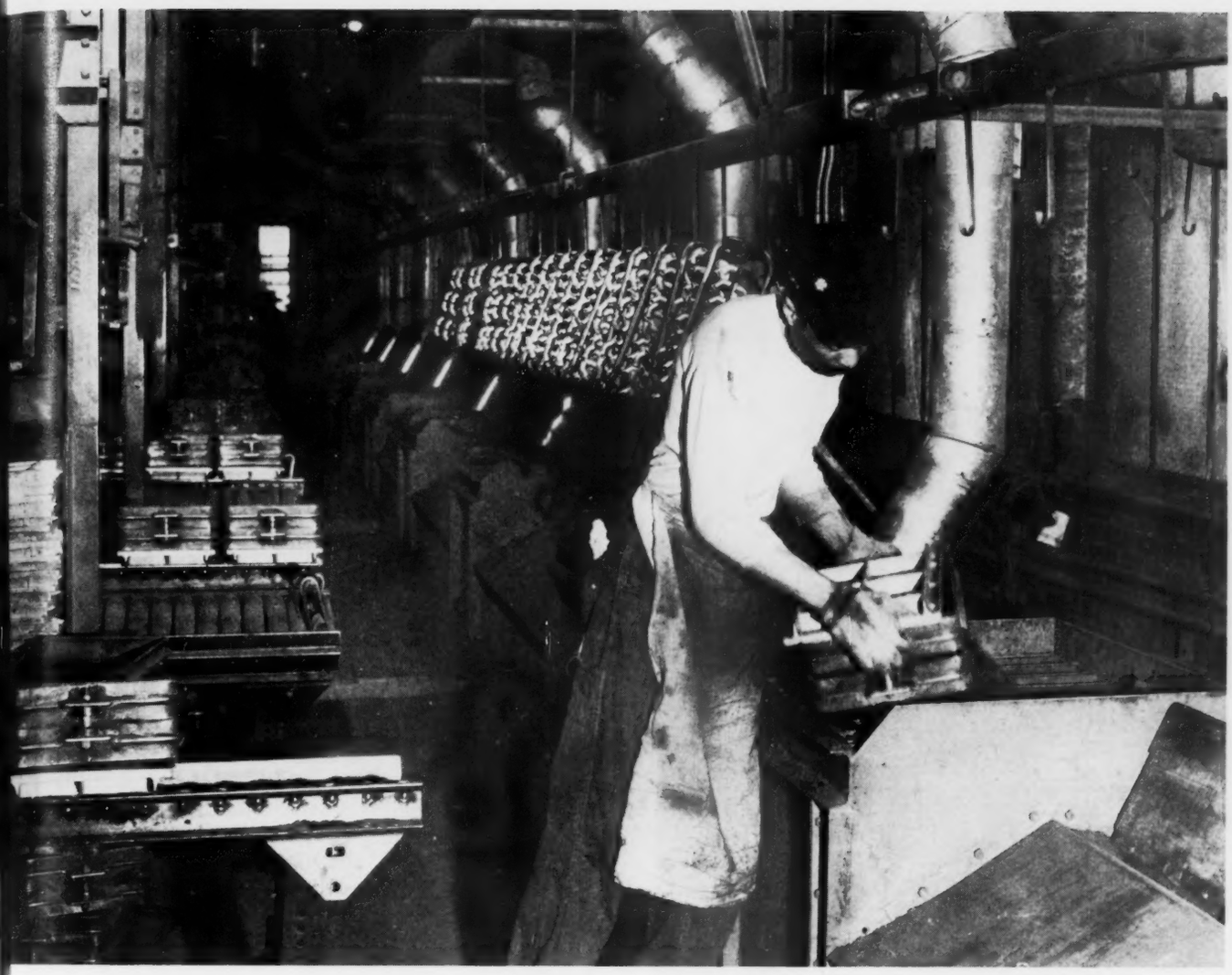


Fig. 7—Sand from dumped molds drops onto shakeout conveyor belt for transport to storage bin. Monorail conveyor takes castings to cleaning room

out conveyor belt. This belt is totally enclosed and the enclosure is exhausted by a dust collector to prevent dust from rising into the foundry.

Gates of castings are hung on a traveling monorail conveyor (Fig. 7) and conveyed to another room where the castings are cut from the gate and cleaned. The monorail conveyor raises and lowers to clear aisleways. Previously, castings were piled on hand trucks and pushed to the cleaning room. The flask itself is now ready for the next mold.

From the shakeout conveyor sand empties into a small deposit receptacle from which it is lifted by a bucket elevator and dumped through a revolving screen into the sand storage bin. Broken cores, pieces of metal and other foreign materials are screened out and deposited into the cart shown in Fig. 1.

Fig. 8 shows the panel board which controls the Gifford-Wood handling system. Each button is legibly marked, and there is a separate button for each element of the system—the skip hoist, muller, molder-sand conveyor, screw conveyor, shakeout conveyor, bucket elevator and castings conveyor. Panel lights go on when any section of the system is in operation. Equipment is interlocked for sequence operation so that one unit cannot feed into the next unless it is in operation.

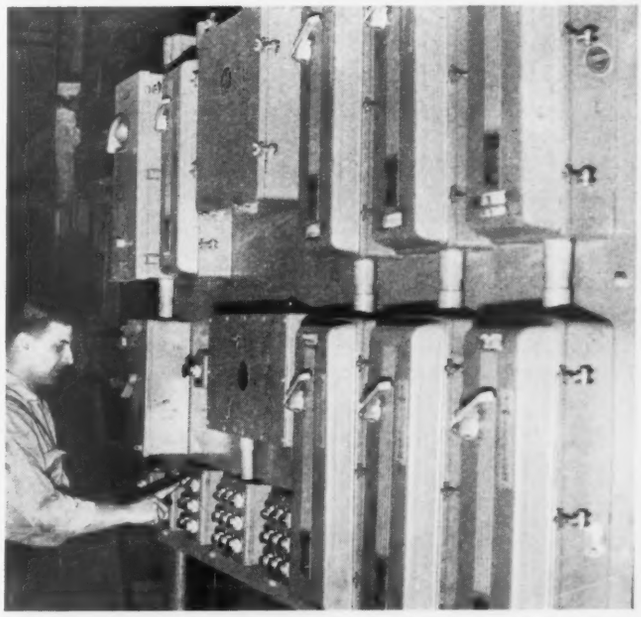


Fig. 8—Panel board which controls individual section of the system, including skip hoist, molding sand conveyor, bucket elevator, etc.

Since earliest development of the casting process the products of the foundry have been widely used to manufacture agricultural implements. This review of certain casting applications was presented before the National Tractor Meeting of the Society of Automotive Engineers in Milwaukee, Sept. 10

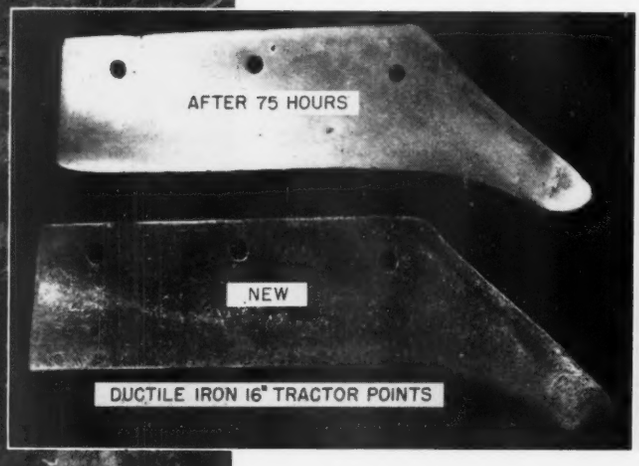
HISTORIANS and scientists have reason to believe that agricultural implements were cast in copper nearly 6000 years ago. Records indicate that production of cast iron plowshares dates back more than 2000 years. Through the intervening centuries great strides have been made in improving the quality of cast products and in developing new and more efficient tools for the farmer. And today, as in the past, castings comprise one of the most important engineering materials from which tractors and implements are fabricated.

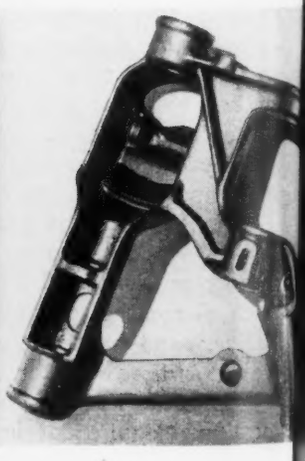
Consumption of castings by farm equipment builders has been particularly heavy during the last 20 years. This period has seen the number of tractors on farms increase from 1 million to almost 4 million; the number of combines in use has risen from 200,000 to 800,000; corn pickers have grown in number from 100,000 to 500,000, and comparable gains have been made in use of numerous other types of equipment.

In recent years tractors and farm machinery have accounted for approximately 15 per cent of all gray iron and malleable iron castings consumed by the leading metal fabricating industries. The latest analysis of casting consumption made by the Bureau of the Census, U. S. Department of Commerce, covers the year 1950. The bureau's breakdown of casting

Fig. 1 (left)—Tractor manufacture accounts for use of large tonnages of iron and steel castings

Fig. 2 (below)—Ductile iron castings employed in the manufacture of farm implements and tractors





The Role of CASTINGS in the AGRICULTURAL Industry

By WILLIAM G. GUDE
Managing Editor
FOUNDRY

use by some 20 principal metal fabricating groups includes a tonnage that represents about 60 per cent of all iron castings shipped that year. Balance of the tonnage comprised iron pipe, railroad car wheels, ingot molds, and requirements of miscellaneous consumers.

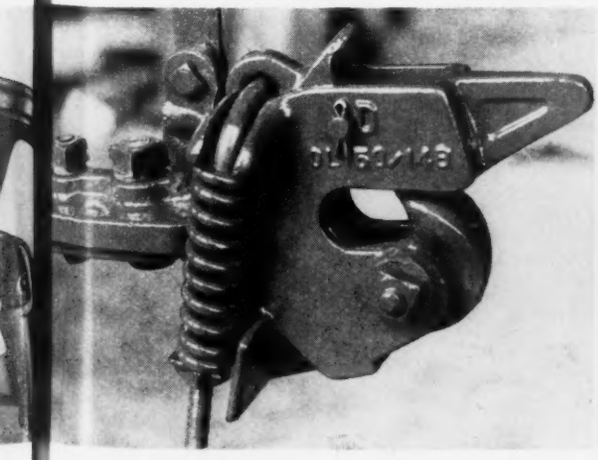
The 1950 figures show that tractor manufacturing consumed a little over 700,000 tons of iron castings, while other farm machinery use was approximately 416,000 tons. This was somewhat more than 13 per cent of all castings consumed by the 20 metal fabricating groups and 8 per cent of production for all purposes. The total of 1,116,000 tons compares with 1,275,000 tons in 1949, when the tractor and implement tonnage represented more than 18 per cent of the fabricators' consumption and better than 11 per cent of all use.

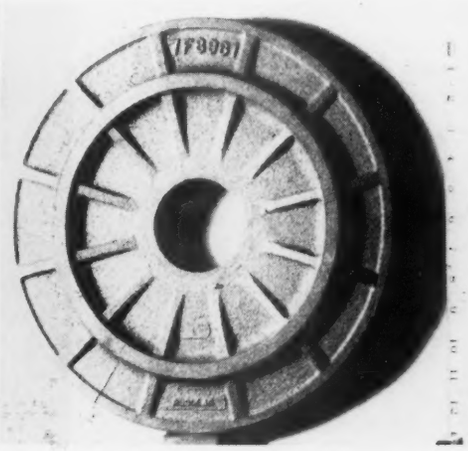
Consumption of castings other than iron is not shown separately in the 1950 government analysis. Use of steel, aluminum, and brass and bronze castings is lumped with the tonnages of wrought products of the same metals. However, individual figures were given in the 1947 Census of Manufacturers. Assuming that the proportionate use of these three metals to that of iron casting did not vary appreciably during the next few years, it may be estimated that 1950 consumption for manufacture of tractors and farm machinery was approximately 60,000 tons of steel castings, 5000 tons of aluminum castings and 2000 tons of copper-base alloy castings.

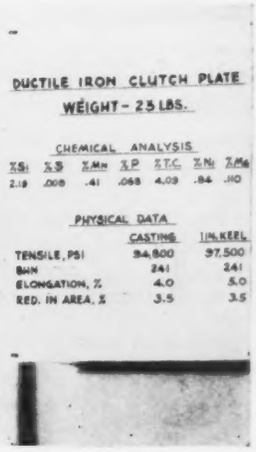
A large percentage of the castings used to build tractors and other farm machinery is produced by industry companies in their own captive foundries. The 1950 data show that 58 per cent of the iron castings used were produced and consumed in the same plant. The remaining tonnage was partly purchased but also includes an unspecified amount of castings represented by what is known as interplant transfers. This latter classification refers to castings produced in one plant but shipped to another plant of the same company for fabrication into finished products. On the other hand, the industry purchases from independent foundries nearly all the steel castings it uses.

Among the various classifications of metal fabricating industries, tractors and farm machinery rank as the second largest consumer of iron castings. In 1950 the automotive industry stood first with a record total of nearly 3,450,000 tons, or more than three times the 1,116,000 tons used for tractors and implements. Tonnages consumed by some of the other leading industries were as follows:

Heating, plumbing equipment	844,000
General industrial machinery	445,000
Special industrial machinery	422,000
Metalworking machinery	331,000
Engines and turbines	285,000
Electrical equipment	225,000
Household machines	217,000
Railroad equipment	115,000







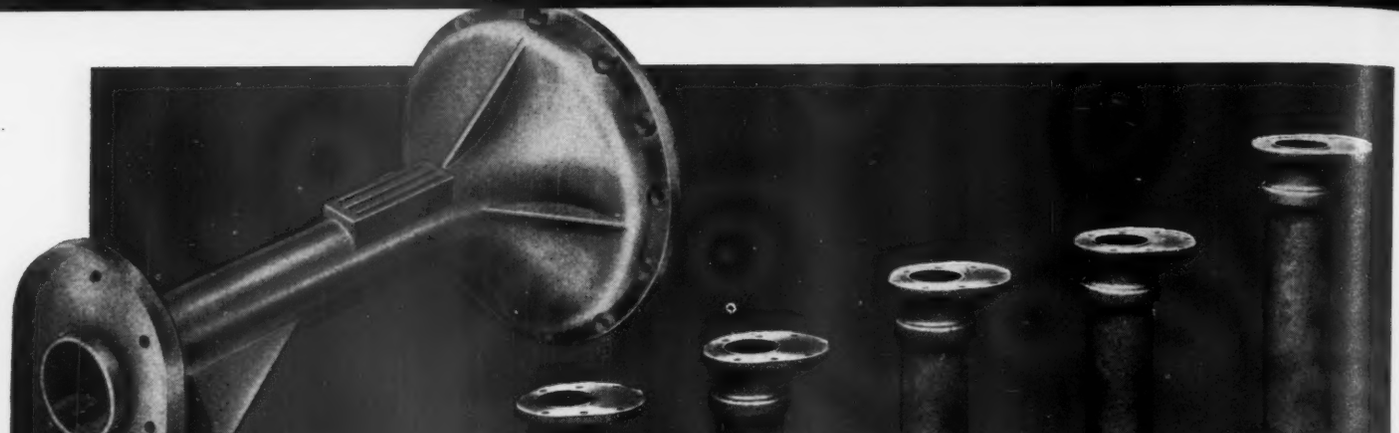
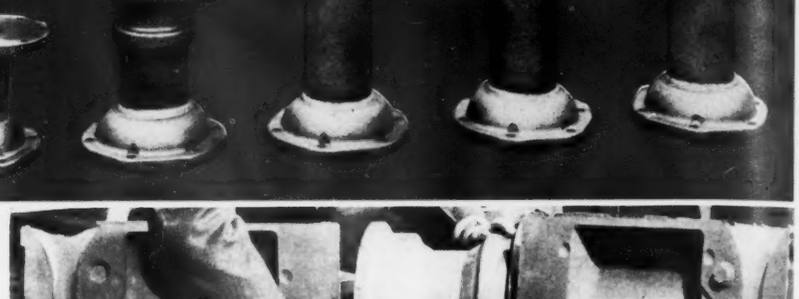


Fig. 3—Tractor drive spacer unit originally made in five different sizes as one-piece steel casting (left), was redesigned as at right. Five sizes are provided by welding varying lengths of steel pipe to castings common to all sizes



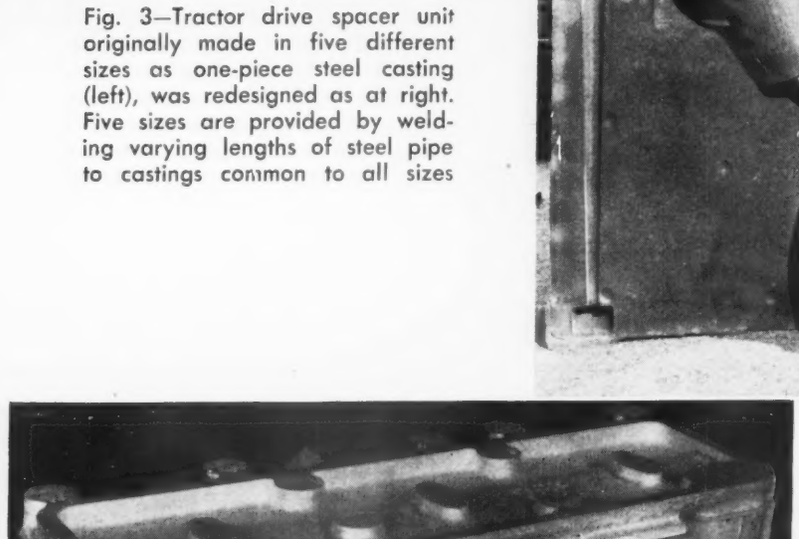


Fig. 4—Tractor roller (top) cast in shell mold weighed 177 pounds as cast. Lower casting, a clutch plate for tractor use, was cast in the type of shell mold shown here

Fig. 5—Cylinder head made by inserting brazing alloy between four individual aluminum castings

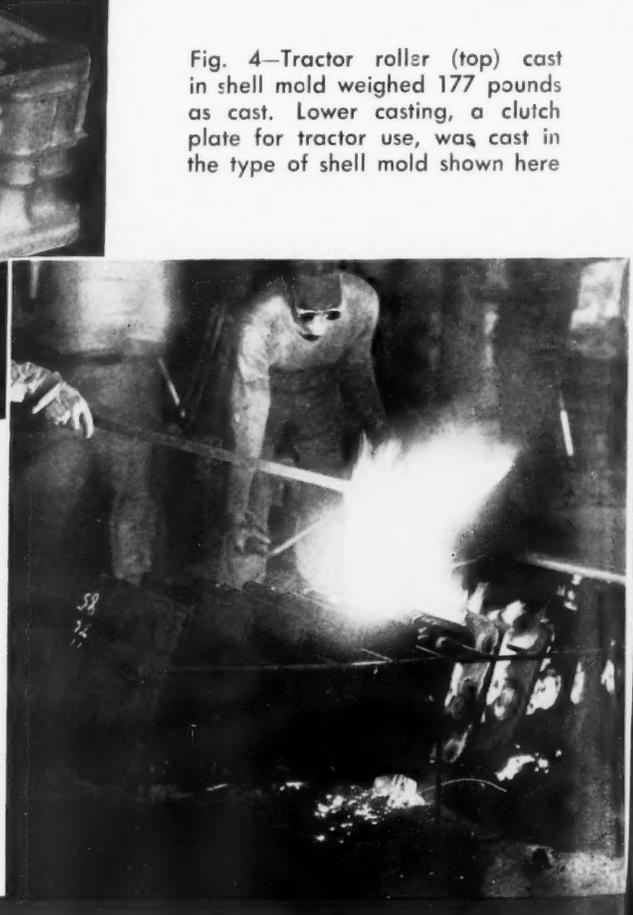


Fig. 6—Pouring stainless steel in shell molds. Tractor and implement castings involve long production runs and offer one of the major potential applications for the shell mold casting process

Some of the foregoing industries, of course, are large users of other types of castings in addition to iron. For instance, annual production of railroad specialties by steel foundries has totaled between 250,000 and 450,000 tons in recent years.

Considering the antiquity of the metal casting process, the number of outstanding technical developments in the foundry industry since World War II is noteworthy. Probably of even greater significance to the average casting user—though less widely publicized—has been the steady improvement during the last two decades in the properties and quality uniformity of conventional ferrous and nonferrous castings. Nevertheless, the recent major developments referred to seem likely to have a vital influence on future design of major types of industrial products, including tractors and implements. Several of these will be discussed briefly.

Precision Investment Castings—Broadened application of the precision investment casting process during and since World War II has provided the answer to many problems of the designer seeking to obtain small, intricate parts of high dimensional accuracy that require little or no machining. This casting method hardly can be termed new; actually it dates back to the early Egyptians. Cellini was its leading proponent 400 years ago, and jewelers and dentists have used it widely in more recent times. However, the impetus given the process during the last war, primarily to produce cobalt-alloy buckets for aircraft engine superchargers, was largely responsible for renewed interest in its possibilities and the subsequent improvements that have occurred in materials and technique employed.

Like a number of other casting processes, precision investment casting has its advantages and disadvantages. For instance, it is a relatively slow process compared with pressure die casting, but it is adapted to casting both ferrous and nonferrous metals. Precision investment castings are superior to conventional sand castings in dimensional tolerances and surface finish, but in most instances are limited to parts weighing 1 pound or less and 8 inches or less in length.

Obviously, numerous factors must be considered before deciding whether or not precision investment casting is the most suitable and most economical method of producing a given part. At the same time, the fact that numerous applications have been developed in recent years attests to its superiority from the standpoints of both cost and quality for manufacturing a somewhat limited range of products.

Nodular Iron—It was only four years ago that Morrogh of England reported that, by the addition of cerium to molten iron, it is possible to produce a spheroidal graphite cast iron of superior physical properties. At the same time the International Nickel Co. announced the development of what it terms Ductile iron, using magnesium as the addition agent to obtain a spheroidal graphite structure. The latter production method, covered by patents, is the one most widely used today.

This material, also known commonly as nodular iron, incorporates gray iron's good castability with high tensile properties, ductility, and good wear resistance and machinability. The American Society for Testing Materials has issued a tentative specification for nodular iron castings, listing two grades:

	Tensile Stgth., psi	Yield Stgth., psi	Per cent Elongation
80-60-03—as cast	80,000	60,000	3
60-45-10—annealed	60,000	45,000	10

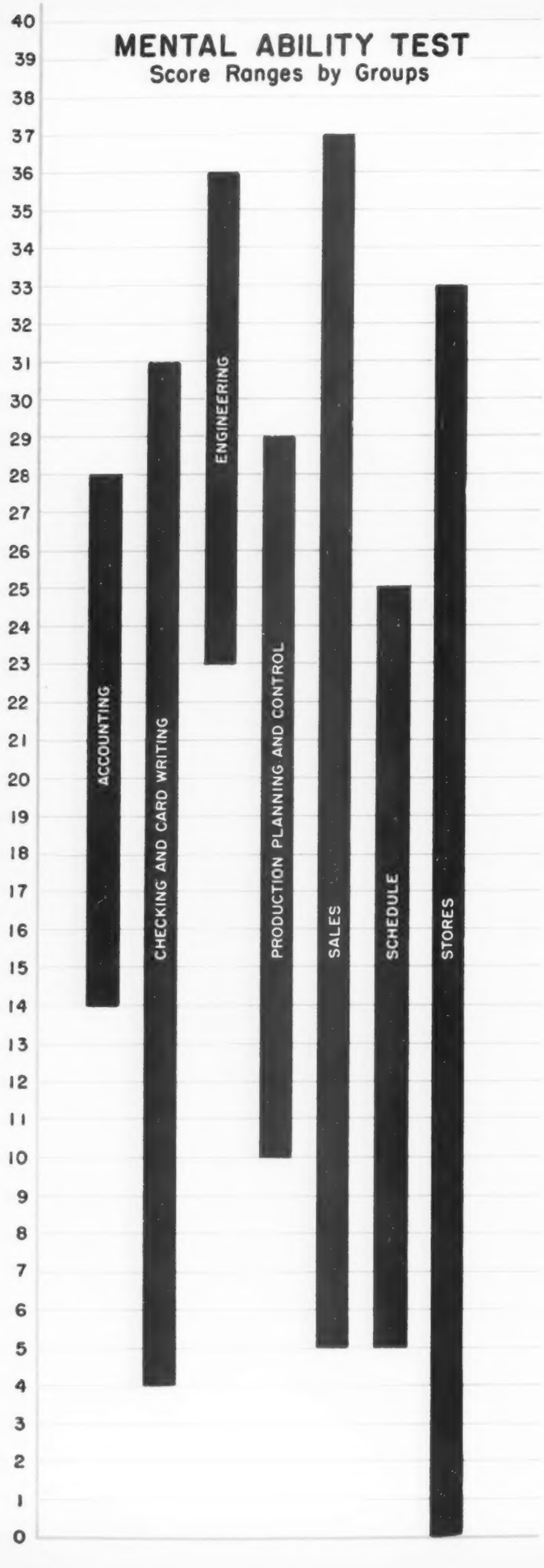
Most of the nodular iron now being produced commercially in this country has a tensile strength of 85,000 to 105,000 psi in the as-cast condition and 65,000 to 75,000 psi in the annealed state. A hardening treatment can produce considerably higher strength values. By a normalized or oil quench and drawn treatment, tensile strengths of 150,000 to 180,000 psi and even higher are obtainable.

Use of nodular or Ductile iron still is in its infancy, but applications are growing. Only about 3500 melt tons was produced in 1949, the first year of commercial production. This rose to 15,000 to 20,000 tons in 1950, while in 1951 the total is estimated at about 75,000 tons. Castings produced have ranged from a few ounces in weight, with a section thickness of 0.1-inch, up to anvil blocks weighing 50 tons and having a section 48 inches thick. A list of regular commercial applications for Ductile iron as of this spring, prepared by the International Nickel Co., includes approximately 500 products.

In production for more than two years, one of the oldest applications of Ductile iron in the tractor industry has been for rings and plates of engine clutches on crawler tractors. Among other tractor and implement parts in regular production (Fig. 2) are plowshares, final drive gear housings, tractor hitches, clutch pedals, pump bodies, power take-off bearing carriers, and pulleys. A more recent application is for large ring gears on hand garden tractors. Possibility that this material will find additional applications for implements and tractors is indicated by current and prospective field tests of various parts, including front axle trunnions, brake shoes, sprockets of all types, motor blocks, crankshafts, camshafts, rotary hoes, wheel hubs and numerous others.

Malleable Iron—Malleable iron castings continue to be the preferred material for many tractor and implement parts. This perpetuates a market which had its inception 125 years ago when the most important applications for the then newly developed American malleable iron were harness hardware and parts for the wagons and coaches of that day.

Consumption of malleable iron castings for tractor and implement production in 1951 was approximately 70,000 tons. This tonnage covered a variety of applications, primarily those (*Please turn to page* 228)



How To Inventory VOCATIONAL

By R. L. BRADLEY
Manager, Training Division
Lester B. Knight & Associates Inc., Chicago

PERIODIC inventories of physical assets are an accepted part of good foundry management. Conditions are such today that it is essential to evaluate regularly all factors having a bearing upon volume and profits. Naturally, facts are infinitely preferable to opinions when it comes to making decisions on business. So it follows that inventories of physical assets always are handled on that basis.

The vocational assets and liabilities at the key job level within a plant have as much influence on volume and profits as the quality and quantity of physical assets. Yet an "inventory" of vocational assets seldom is taken. What is more, personal judgment is most often the basis for evaluating personal performance and ability.

At least part of the reason for this is the not entirely unfounded belief that either there is no absolutely fair, dependable means of scientifically evaluating personal performance, or, if such a means does exist, it would be too costly and complitated for the average concern. Actually, a personnel inventory which does supply factual data to support personal judgment in measuring present and future job ability and performance can be simple, inexpensive and employed to the benefit of any size concern or type of operation. This is borne out by the following case history of such an inventory conducted recently in a large jobbing steel foundry.

Due to contemplated changes in organizational structure and manning, the inventory was made in accounting, checking and card writing, engineering, production planning and control, sales, schedule and stores activities. Ninety-seven men were involved, distributed as follows:

Accounting	5
Checking and card writing	36
Engineering	10
Production planning and control	12
Sales	8
Schedule	9
Stores	17

Each of these groups was inventoried individually. The materials employed for inventory purposes were a standard test of mental ability and a battery of aptitude tests whose factors were specially selected

ASSETS and LIABILITIES

Assets of your key personnel have as much influence on volume and profits as do your physical assets, but they are seldom inventoried. The author discusses how these vocational assets and liabilities can be readily checked. Such an inventory method, once set up, can then be taken periodically by regular company personnel

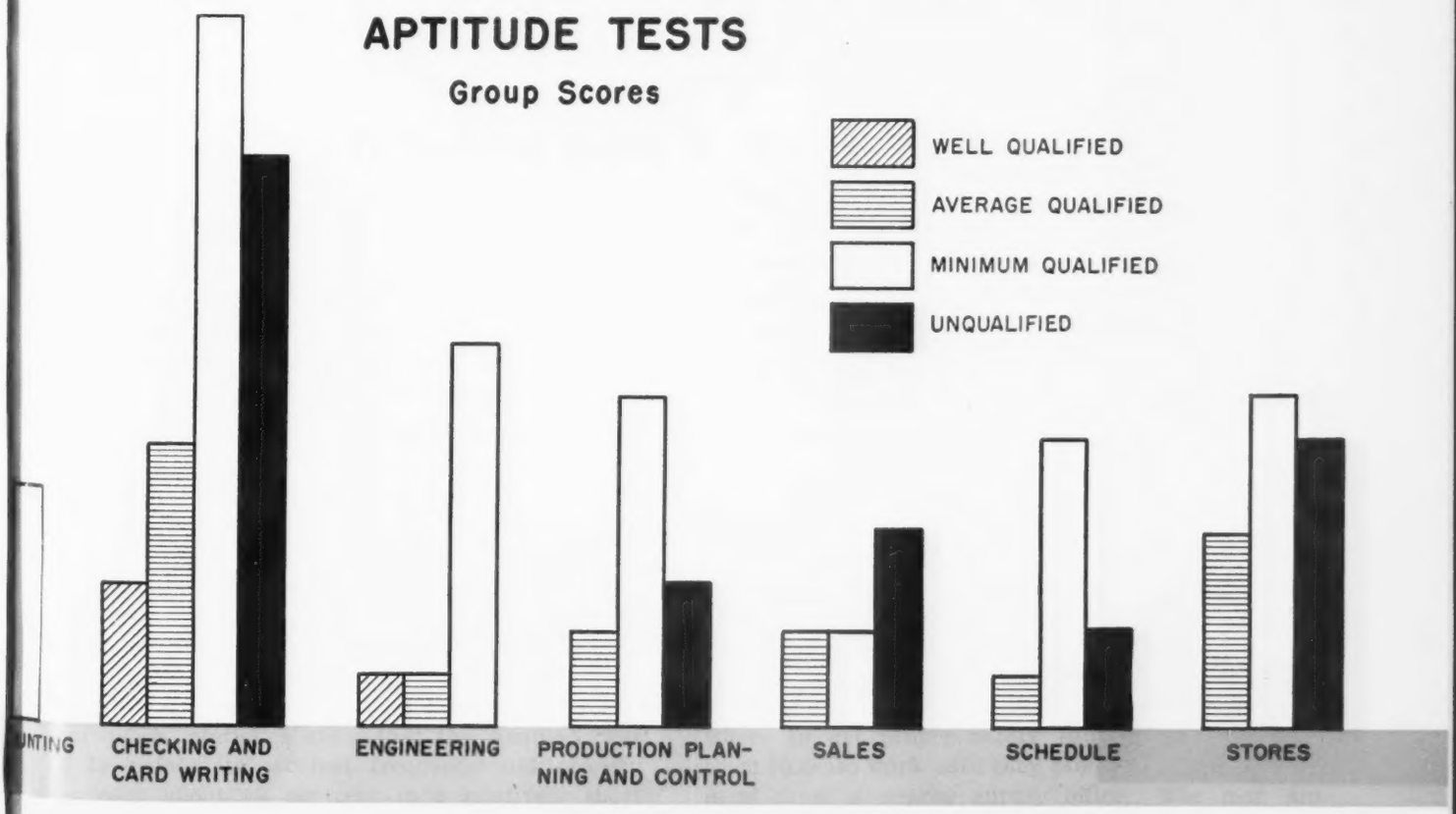
for each job classification undergoing consideration.

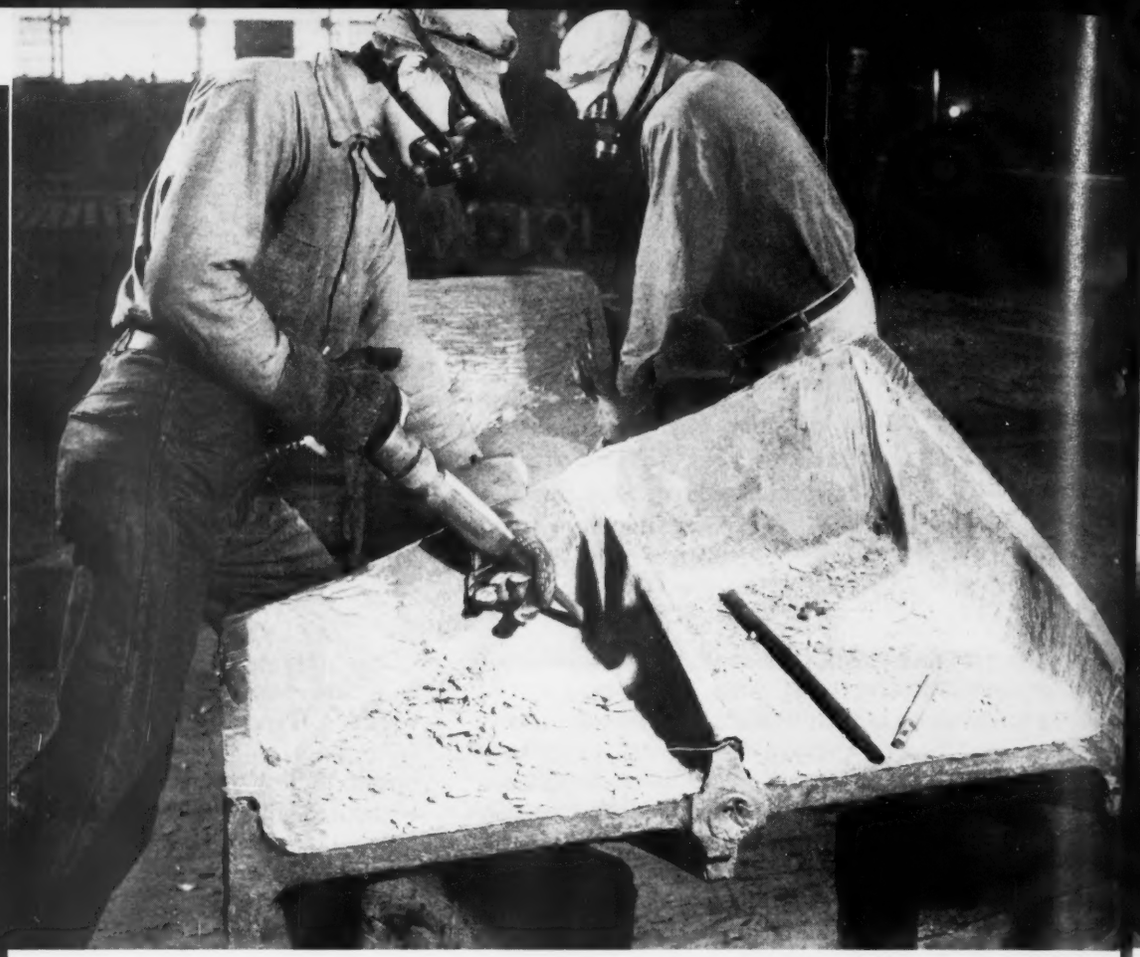
Lest the word "test" used in the foregoing give the wrong impression, the materials employed were short, practical and proved through the use and experience of many concerns in a wide variety of industries. Purpose of these tests is to provide a clue, which should be followed up by personal study and analysis, rather than come up with a conclusion, which is the object of more complex psychological testing. No elaborate preliminary research was necessary in the use of the tests employed in this personnel inventory.

Tests were administered to all individuals within each group at one time. Testing was done during regular business hours but away from the job so there would be no distractions. Time necessary for administering the tests did not exceed an hour for any of the groups.

The program was introduced to the men to be tested as an inventory of skills rather than a test—a term which is frequently regarded with suspicion, especially by those who are to be tested. It was shown that rather than a means of culling out misfits, this was an opportunity for each man to demonstrate special capabilities he might have, and which well might remain unknown to management in the normal course of events.

The mental ability test was administered primarily to indicate the individuals within each group who should fit into, learn quickly and perform efficiently in practically any job classification requiring the understanding and use of words, the ability to understand and think in terms of numbers and symbols and the ability to think in terms of ideas. The test employed has been specially (*Please turn to page* 220)





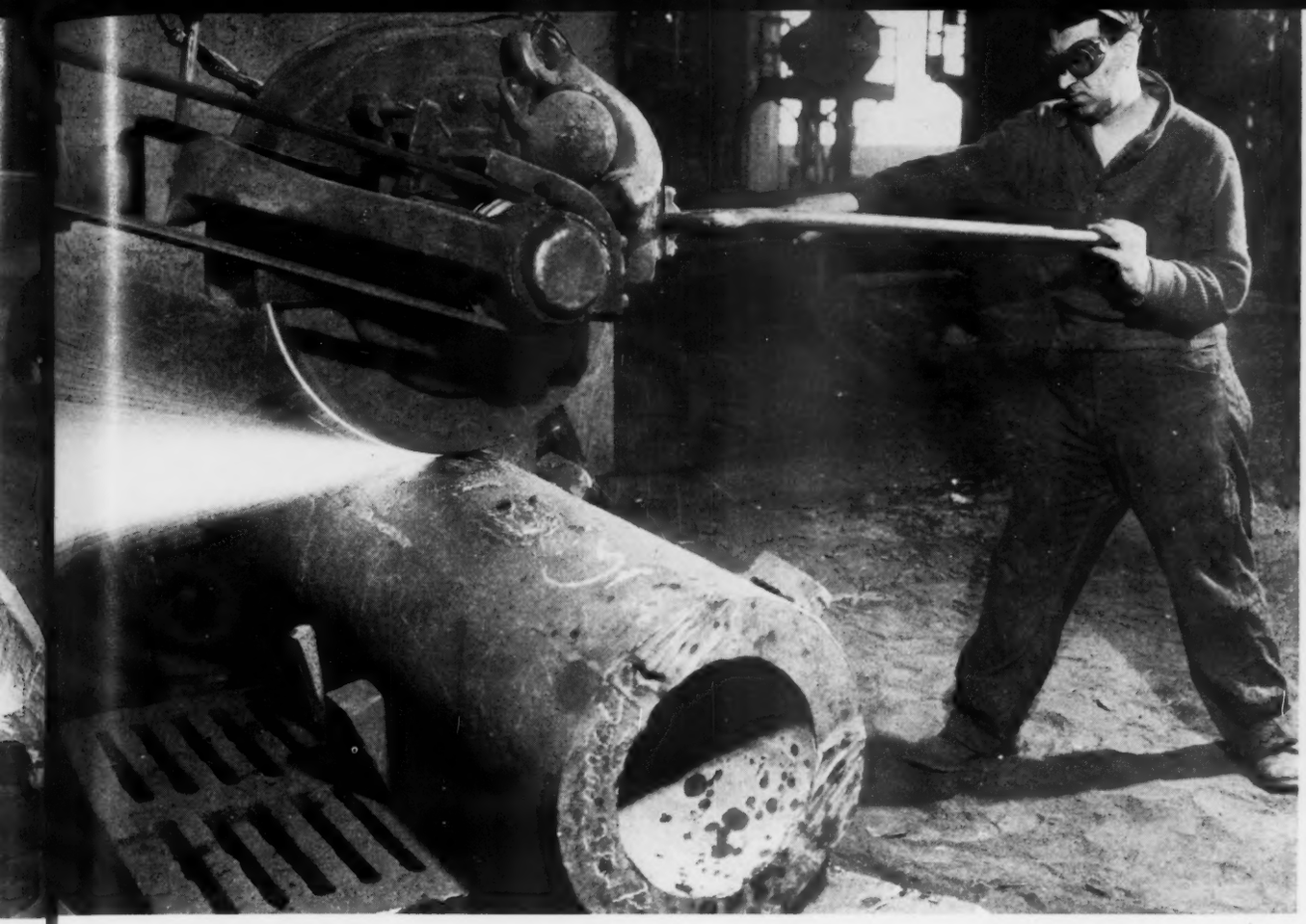
Above—Goggles and respirators protect these workers as they finish chip a steel casting. *Left*—Protective devices that find wide foundry applications are, top to bottom: Leather mask goggles, sand blast helmet, and full-face plastic shield

MAKING THE FOUNDRY SA

for Top Production

To guard against injuries safety equipment must be used correctly. In discussing foundry hazards, particularly those affecting the eyes, the author describes how some companies have successfully implanted a safety consciousness among workers and thereby reduced accidents markedly

By STANLEY C. HERBINE
Manager, Industrial Sales Department
Willson Products Inc.
Reading, Pa.



Operator of swing frame grinder wears cover-all cup goggles in working on stern tube casting at the Birdsboro Foundry & Machine Co., Birdsboro, Pa.

SAFE

ACCIDENT prevention is always important, but especially so when production is running at a high level. Though there has been improvement in foundry safety practices the last two years, the foundry industry still stands below the average frequency rate of 40 basic industries, according to the National Safety Council. Statistics show that the frequency index in foundries in 1950 stood at 13.2 lost-time accidents per million man-hours. In 40 basic industries the 1950 index was 9.3.[1] The figures leave no doubt about the need for safer foundry practices.

Birdsboro Steel Foundry & Machine Co., Birdsboro, Pa., provides an example of what can be done to reduce accidents. Birdsboro makes machinery and heavy steel castings, and its foundry employs the various operations which offer potential accident hazards. These include grinding, chipping, welding, oxyacetylene cutting, and the handling of heavy parts. Nevertheless, statistics show that the company was able to reduce its accident frequency and severity rates each about 40 per cent in a relatively short period through institution of a well run safety program.

These are the steps that were taken:

1. *Issuance of the proper safety equipment* for the job to all workers—and protective goggles to persons who visit the foundry.

2. *Education*—

   a. The foremen are educated through periodic safety meetings, by film and lecture, and the foremen carry the message to the men on the floors.

   b. Bulletin boards continually carry new safety posters.

   c. Training is given to all new employees, who receive letters of instruction containing plant rules and regulations, safety rules, and what to do in case of accident.

3. *Plant Patrol* by the safety director, who calls violations to workers' attention, instructing them where to get proper safety equipment and telling them to cease work until they procure the right equipment from a nearby supply office. The men are

Respirator and cup goggles are worn by worker as he cuts into a runner for a turbine with oxyacetylene torch

Far right—Helmet worn by this operator has flip-front for quick inspection of the weld

warned several times. If the warning is not heeded, they are discharged. However, few men are discharged for infraction of safety rules, because they know that this disciplinary measure *will* be fulfilled.

Although many of the steps taken by Birdsboro are included in other safety programs, this plant is outstanding in improvement of its safety record because of constant, strict patrol and the enforcement of disciplinary measures.

Another company, the Chattanooga Division of Combustion Engineering-Superheater Inc., manufacturer of steam generating and fuel burning equipment, has approached the problem from a different angle. It places emphasis on equipment. Faced with the need to increase production, it determined to cut out lost-time accidents, or at least reduce them to the irreducible minimum. First thing done was to be sure each worker had the proper personal protective device for his type of work.

Next came the instruction. Whenever an employee was placed on his job, he was instructed thoroughly in the proper use of his safety equipment. This gave him a sense of security and confidence which has been paying off in increased production.

Since this program was put into effect, Combustion Engineering's accident experience has shown a 60 per cent improvement and its records show clearly that personal safety devices have played a major part in this increase. Eye injuries in the welding department have dropped 20 per cent, and since the adoption of the respirator approved for the specific hazard on each job, not one case of occupational respiratory disease has been recorded.[2]

The experience of these two plants proves that both the safety record and production can be improved with the proper care. But nothing can be accomplished unless there is an awareness of specific hazards, a knowledge of how to control them, and a workable method of getting the men to use safety equipment.

Foundry Hazards and Their Elimination—Eye injuries may be caused by large flying objects, such as metal from chipping or rough grinding castings. Injury from small flying particles is encountered in such occupations as scaling and grinding of metals, sand or shot blasting, or the use of any abrasive tool. The eyes may be exposed to harmful radiant energy in welding and in oxyacetylene and oxyhydrogen cutting, tending electric arc furnaces, and in electric resistance welding and brazing. And finally, metallic splash offers a fourth class of eye hazards.[3] The danger to the eyes from splashing molten metal in pouring castings is one of the most serious of all industrial eye hazards.

At Birdsboro eye injuries have been reduced from as many as six to eight a day to less than two a week through insistence on the men wearing goggles. At the beginning of the safety drive, the safety director walked through the foundry and found 11 men working with their goggles on their foreheads. At the weekly supervisors' meeting, he discussed the matter forcibly—with the result that carelessness has been considerably diminished. But he warned that it takes constant supervision and admonition to keep the eye accident record down.

Respiratory disturbances in the foundry may come during short periods in a few specific operations, unless the men are provided with respirators and shown the importance of wearing them. Men engaged in mold shakeout work do need respiratory protection. For those on heavy finishing work, respirators are

Top — Heavy-duty cup goggles. *Center* —Spectacle type goggles. *Bottom* — Respirator

needed to protect against dust generated in grinding. Respirators should also be worn on maintenance work —for example, when cupolas and open-hearth furnaces are rebricked, workmen need dust respirators at certain times during the operation.

In modern foundries, or in older foundries with a good ventilation system, respirators are not required if the dust count is within a safe limit. But it should never be assumed that the count is within safe bounds. The finer dust particles cannot be seen by the naked eye, and the dust count should be determined scientifically by dust analysis instruments at regular periods as a check on the ventilation system and as a precaution for workers' health.

Many of the hazards incident to foundry work can be eliminated through use of the proper protective equipment. Various types of devices are available for protecting the worker against large and small flying particles, against splashing metal and radiant energy from welding operations or hot metal. These devices include different types of goggles, spectacles, face shields, helmets, gloves and leggings.

Metal, plastic or leather may be used in goggle frames. Which type to choose depends on the working conditions. Goggles with metal and plastic frames are generally chosen for resistance to high impact. Leather or plastic with insulated bound edge is desirable where temperatures are high—to avoid burning the skin. Safety spectacles with metal frames are chosen when exceptional strength is needed, or for unusually high temperatures. Plastic frames are used for skin conditions, or in atmospheres that are corrosive to metals. The fibre frame is normally confined to hot inspection work that does not require constant goggle use.

Since cup goggles have a tendency to fog, always select models with good ventilation. Direct ventilated ports can be used where protection against impact alone is needed. But when harmful radiation and dusts are encountered, indirect ventilating ports are required. Anti-fogging agents are available for goggles that, because of the atmosphere in which they are used, cannot be well ventilated.[4]

Protection against silicosis requires an approved Bureau of Mines respirator. Where fumes and gases exist, the proper type gas mask or a chemical cartridge respirator should be selected to fit the particular condition.

Getting Safety Equipment Worn—At the beginning of the safety movement, safety was centered on mechanical guarding. Then safety engineers began to realize that a machine could be shielded, but the shield would do no good unless it was pulled into the guard position. In short, protective devices—either personal or mechanical—are not a cure-all. Accidents must be controlled at their source—by developing proper attitudes in the minds of the men. To be effective, safety devices must (*Please turn to page* 277)

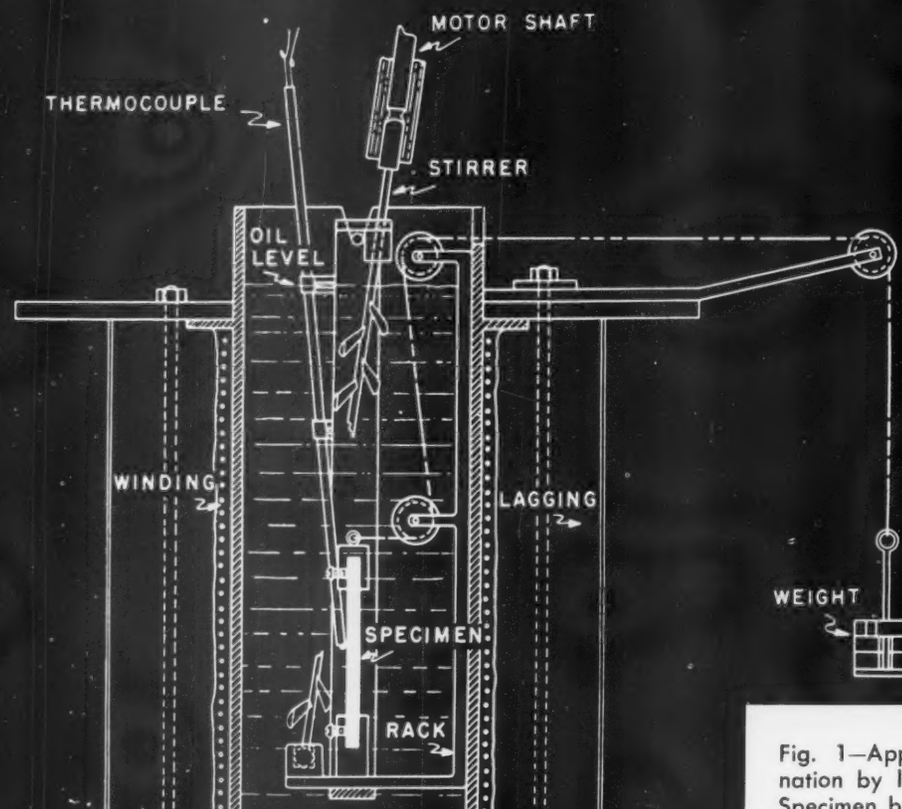


Fig. 1—Apparatus for solidus determination by liquid film rupture technique. Specimen bar is heated slowly in oil or salt bath while under light load. Weight drop indicates rupture occurring by fracture through the intercrystalline liquid films developed at solidus temperature

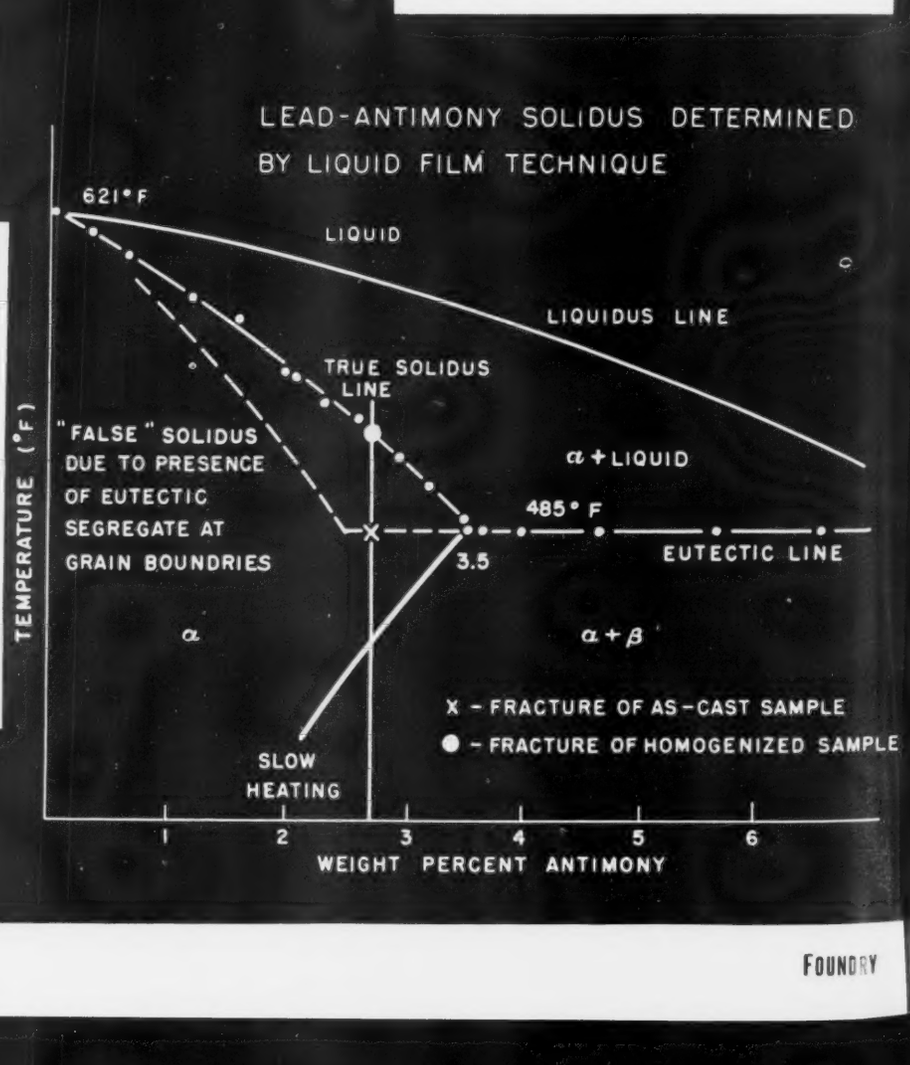


Fig. 2 — Illustrating true solidus line for material which has been cold worked and homogenized to remove low melting eutectic segregates at grain boundaries. Also, "false" solidus obtained if these precautions are not observed. Temperature range between the true and false solidus points represents abnormal liquid film stage caused by the segregate materials

Strain Theory of

HOT TEARING

New light on the cause of the common casting defect of hot tearing is shed by recent investigations. These indicate that hot tearing actually represents fracture through liquid films existing at near-solidus temperatures

By WILLIAM S. PELLINI
Head, Metal Processing Branch
Metallurgy Division
Naval Research Laboratory, Washington

HOT tearing is recognized as one of the most common and serious defects encountered in castings. A great deal of research effort has been expended in attempts to determine the principal variables which determine the development of hot tears. However, the extensive literature which resulted from this effort over a period of years, is for the most part highly contradictory except on the very evident facts that hot spots and restraint are the primary causes of the defect. That such is the case is all too well appreciated by foundrymen as the result of bitter experience with gate and riser contacts, re-entrant angles and enlargements in the castings.

In the face of the contradictory reports by capable investigators as to the effects of such variables as composition, deoxidation, pouring temperature, etc., it is necessary to go back to fundamentals and approach the problem with a completely open mind. In this respect it is most fundamental that the metal conditions at which hot tears are developed be determined beyond question.

The generally accepted premise that hot tears result from the rupture of weak and non-ductile solid metal at temperatures several hundred degrees below the solidification point is in contradiction with our basic metallurgical knowledge of metal properties at high temperatures. In fact, many of the tearing temperature ranges suggested for steels fall within the limits ordinarily used for rolling and forging, at which temperatures the metal behaves in an exceedingly ductile and plastic fashion.

Recent investigations by the Naval Research Laboratory have demonstrated that hot tearing actually represents fracture through liquid films which exist at near-solidus temperatures. The incorrect temperature ranges determined previously were the result of improper use of thermocouples; the low readings were obtained because the themocouples were not immersed in the metal (usually small test bars) sufficiently to eliminate cooling of the couple by heat flow along the wires. As the result of this misconception a great deal of attention and theorizing was devoted to mysterious brittle properties of solid, hot metal and no consideration was given to factors related to the solidification of the metal.

Inasmuch as hot tears represent a failure on the part of the metal to behave in a ductile fashion while not completely solid, it is of primary importance that the basic metallurgical reasons for this behavior be understood. It may be surprising to the foundry field

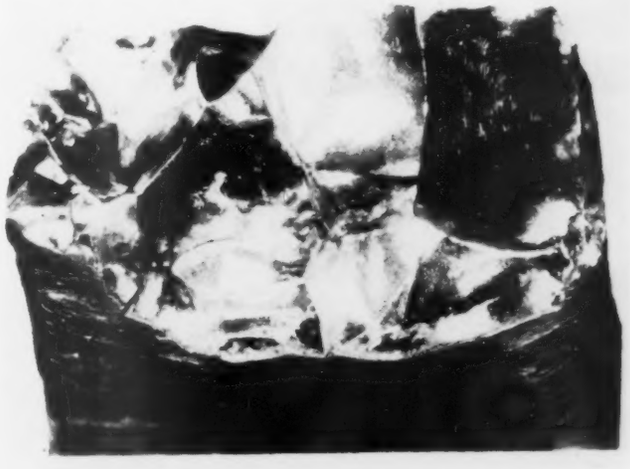
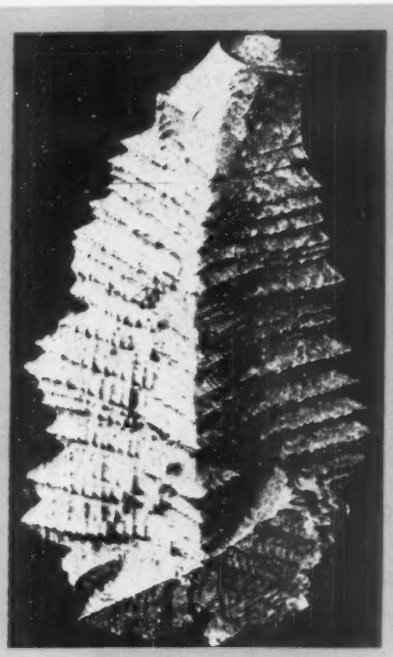
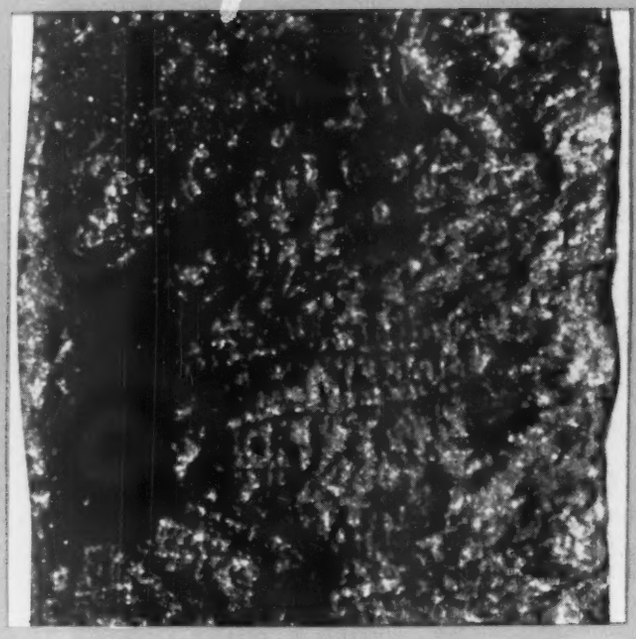


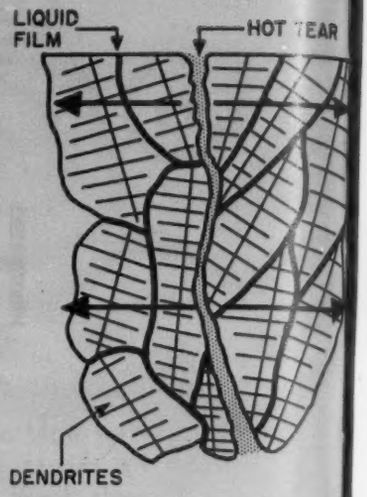
Fig. 3—Fracture from rupture through intercrystalline liquid films in Pb-Sb alloy. Test bars usually break into several small sections, illustrating metal fragility in liquid film presence



SINGLE DENDRITE GRAIN



TYPICAL HOT TEAR, CLASS "B" STEEL



SEPARATION AT FILM STAG

Fig. 4—Illustrating development of hot tearing in castings by fracture through interdendritic liquid films existing near true solidus temperature, or in range of true and "false" solidus temperatures if low melting segregate materials are present. Perfect dendritic outlines of hot tears require such a fracture method

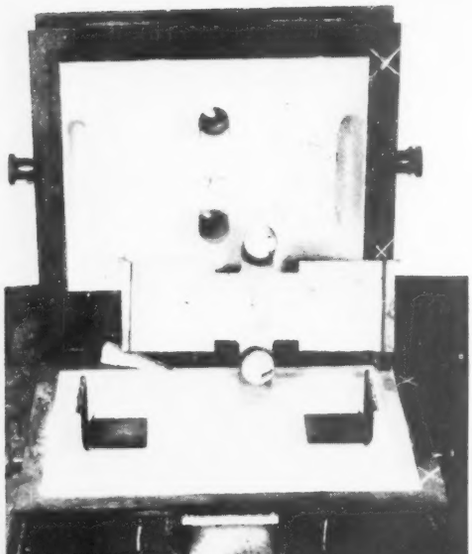
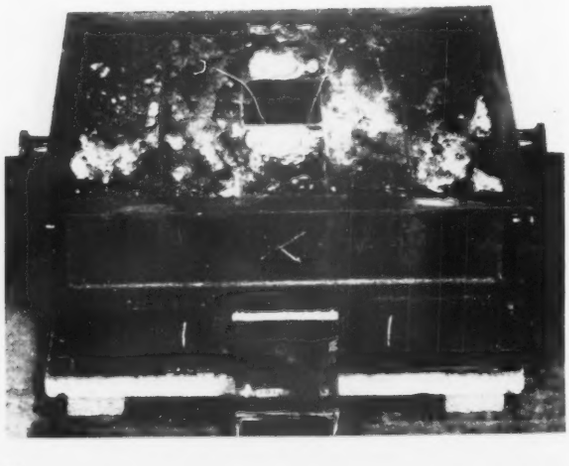


Fig. 5 — Test casting and mold used to measure radiographically temperature of hot tearing. Note the well cut in cope and film holder on a sliding arrangement in drag



that this non-ductile behavior of near-solid metal has been investigated extensively by the metallurgical field. The information which was obtained has not been translated to the foundry field for the reason that the "hot tearing" problems of the other technologies are disguised by such terms as "hot cracking," "burning," "hot shortness," "tenderness," etc.; it will be demonstrated that these various types of defects are one and the same from a metallurgical viewpoint. If this is appreciated, the foundryman will find an extensive amount of information available to him which will provide new bases for understanding the fundamental causes of the hot tearing problem.

The Film Stage Concept—In passing through the solidus temperature range, irrespective of whether the process entails heating or cooling, the metal develops a condition of essentially continuous liquid films. This behavior is fundamental to alloy systems and is accordingly not subject to control. Because of its fundamental nature this behavior is utilized to determine the position of solidus lines in phase diagrams. A number of specimens are heated to various temperature levels, then quenched and examined metallographically for signs of film liquation at the grain boundaries. The lowest temperature which indicates liquidation is taken as the solidus temperature.

As should be expected, the strength and ductility of a mass of solid grains separated by liquid films is of extremely low order. Inasmuch as the liquid films are developed in a very narrow temperature range, the strength and ductility of a metal which is being heated slowly will show a drop to essentially zero values at a sharp temperature interval.

A method for determining the solidus of low-melting alloys which depends on the low strength and ductility of the metal when at film stage was developed by the writer[1] and is now in general use. Fig. 1 illustrates the method, which entails slow heating of test bar under a very small load. When the solidus temperature is reached, a thin but continuous liquid film is formed, resulting in the immediate intercrystalline rupture of the bar, as illustrated in Fig. 3. The solidus line determined for the lead-rich side of the lead-antimony system[1] by this method is shown in Fig. 2; check points on this curve were obtained with a reproducibility of $\pm 1°F$, illustrating the fundamental nature of liquid film formation.

It should be expected that if the grain boundaries contain a continuous network of low-melting segregate material, the liquid films should form at the solidus temperature of the segregate material and that fracture should occur at that temperature. If the network is not continuous, the fracture occurs at some intermediate temperature which depends on the amount and distribution of the films. In the case of the lead-antimony alloys, failure to cold work and homogenize the metal so as to remove low-melting eutectic material from the grain boundary resulted in fracture at the eutectic temperature rather than at the solidus temperature for compositions which approached the limits of solid solubility, as may be observed from the "false" solidus diagram of Fig. 3. As the composition approaches that of the pure metal the amount of segregate which may be formed is greatly reduced, hence the distribution of the segregate becomes less continuous and less effective in lowering the film stage temperature.

Significance of Film Stage Concept—The solidus determination experiments clearly indicate that a condition of extreme fragility occurs as the metal develops liquid films. From a metallurgical viewpoint the development of hot tears in castings is a similar process in that the separation occurs through the liquid films which exist either at the true solidus of the metal or in the range of temperatures between the true solidus and the "effective" solidus of the segregate materials. The mechanism of film stage separation in hot tearing of castings is illustrated schematically in Fig. 4. The similarity to the case of "hot tearing" on heating of the test bar for the solidus determination is evident—in the case of the casting hot tear, the "grains" are the dendrite crystals of the nearly solid mass.

The detailed evidence which supports this conclusion has been evolved in a recent investigation[2] which was planned to determine the conditions of solidification at which hot tearing occurs so that the mechanism of hot tearing of castings could be established. This investigation was conducted by x-raying castings during solidification and relating the time of origin of hot tears to the existing condition of solidification deduced by thermal analysis. A simple casting system was utilized which permitted a wide range of control over the contraction conditions. In addition, the development of strength and ductility through the period of solidification was determined by tensile type tests at various stages of solidification, utilizing again a simple casting system amendable to exact thermal analysis. The various findings were interrelated to deduce the interactions of metallurgical (metal and solidification) and mechanical (stress and strain) factors which determine the development of hot tears.

Determination of Hot Tearing Temperature—The temperature at which hot tears originate was determined by means of a series of radiographs of a casting while it solidified and cooled in the mold. Tests were first made on 4 per cent copper-aluminum alloy because of its low x-ray density, and then extended to steels. The test casting and molding procedures used are illustrated in Fig. 5. The castings were 1 inch thick for aluminum and ½ inch thick for steel. Restraining bars were placed between the flanges to provide a reproducible condition of hindered contraction, and chills were placed against the flanges and over the horizontal portion of the castings adjacent to the flanges to accelerate cooling in these regions and hence cause a rapid contraction of the casting. The resultant strain was thus concentrated at the hot central portion of the casting between the two risers.

The mold above and below the central portion of the casting between the risers consisted only of 1-inch-thick layers of sand reinforced with perforated 1/16-inch-thick steel sheet (note well cut in mold). X-ray exposures through the central sections of the castings were obtained at intervals of 30 to 60 seconds on film placed in the opening beneath the casting.

The cooling cycles at the center planes of the castings between the risers where tearing occurs were determined by means of thermocouples connected to automatic recorders. The thermocouples were placed in quartz tubing of 1/16-in. OD bent in the shape of a square "U," with the bottom of the "U" about 3 inches long and located in the casting center-plane. The thermocouple bead was positioned at the center of the "U" with a thermocouple wire leading out through each end of the tube. Thus, the thermocouple was immersed in the center of the casting for the equivalent of at least 1½ inches which is required to obtain accurate readings. This is the precaution missed in

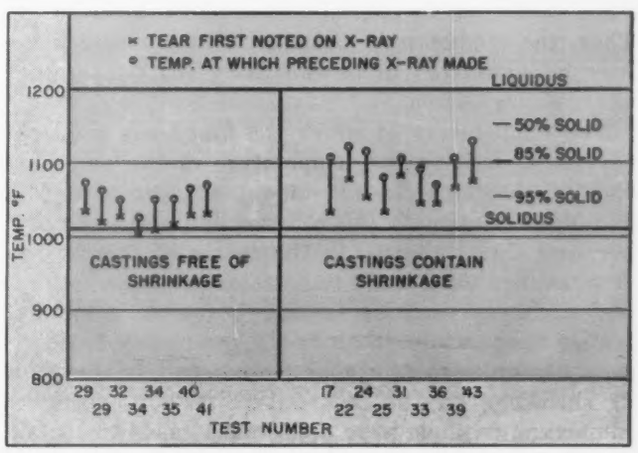
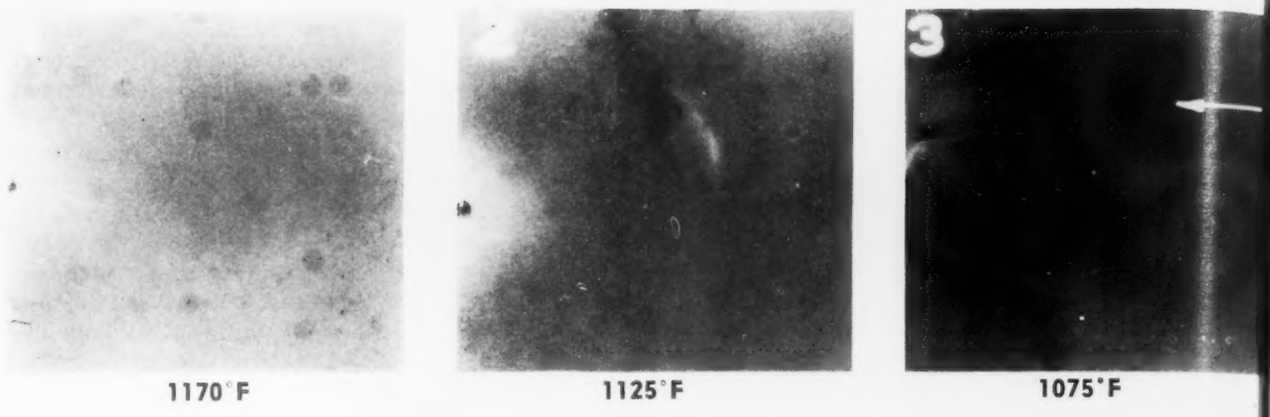


Fig. 6—Temperature at which first tears were observed, and temperature of preceding radiograph which did not show tears, plotted in relation to solidification state of 4 per cent Cu-Al alloys



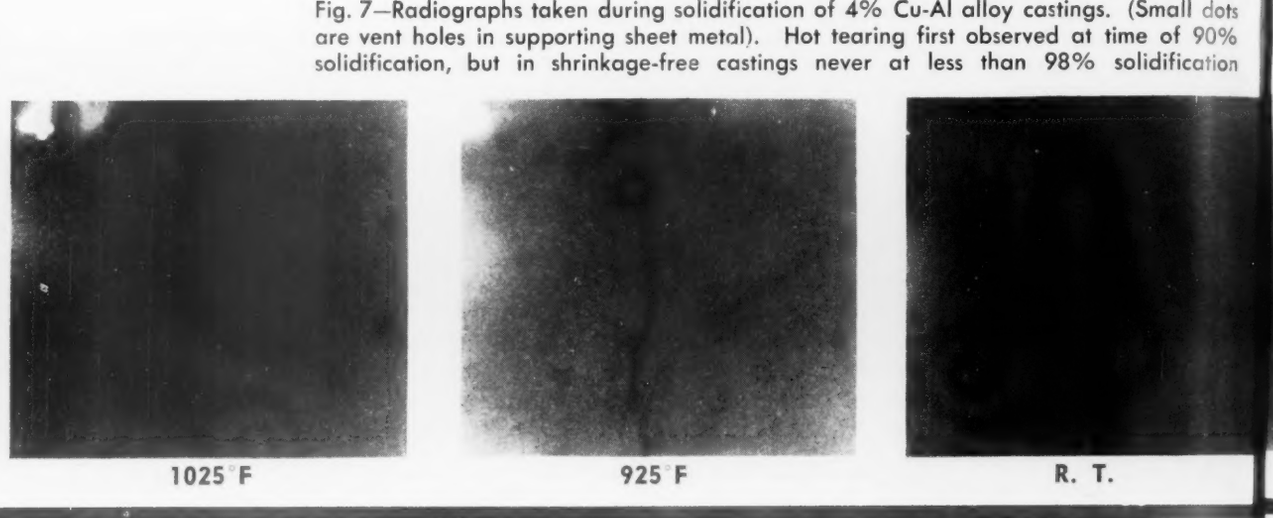


Fig. 7—Radiographs taken during solidification of 4% Cu-Al alloy castings. (Small dots are vent holes in supporting sheet metal). Hot tearing first observed at time of 90% solidification, but in shrinkage-free castings never at less than 98% solidification

earlier investigations which led to the conclusion that hot tearing occurred at temperatures 300-400°F below the solidus.

Temperatures were measured at the casting center plane because of the greater accuracy which could be obtained. It was found that in both the aluminum and steel castings the temperature differential between the surface and center plane did not exceed 10°F and that the center temperature lagged that of the surface by only a few seconds because of the rapid cooling at the critical solidus temperature range. Thus, the temperature measured at the center plane may be considered to be effectively the temperature of the entire section.

The temperature at which the first tears were observed, as well as the temperature of the preceding radiograph which did not show tears, are plotted in Fig. 6 in relation to the solidification state of the 4 per cent Cu-Al alloys. In the course of this work a few castings were found to contain shrinkage pockets, and in these castings tearing began at somewhat higher temperatures than in the completely fed castings. In order to determine more definitely the effect of shrinkage on the temperature of hot tearing of aluminum, castings were deliberately made to contain shrinkage by reducing the riser diameter and the riser contact. The temperatures at which tears were first noted in the inadequately fed castings varied from 1020°F to 1075°F, as shown in Fig. 6; the average tearing temperature is in the order of 30°F higher than for the shrinkage-free castings. At these higher temperatures the solidification conditions differ from those of temperatures nearer the solidus primarily in the width of the interdendritic liquid film regions.

Fig. 7 shows a series of radiographs for castings containing shrinkage. It can be seen that the hot tears originate in the shrink area which was invariably the case for castings which developed shrinkage.

Similar radiographic observations and thermal measurements were made on steel castings of various carbon contents ranging from .03 to 1.00 per cent. Except in the case of special additions, the sulphur and phosphorus content was .02 per cent. A typical series of radiographs illustrating the development of hot tears in a .33 per cent C steel is shown in Fig. 8. As in the case of aluminum, tearing was considered as starting between the temperature at which the tear was first noted on the radiograph and the temperature at which the preceding radiograph was taken. These two temperatures are plotted on the Fe-C constitution diagram as tearing temperature range vs. carbon content (Fig. 9). It is noted that tearing over the whole range of carbon contents begins in the vicinity of the solidus temperature.

In order to relate the effects of sulphur and phosphorus to the temperature of hot tearing, the contraction conditions of the test casting were modified to the point that the low sulphur and phosphorus

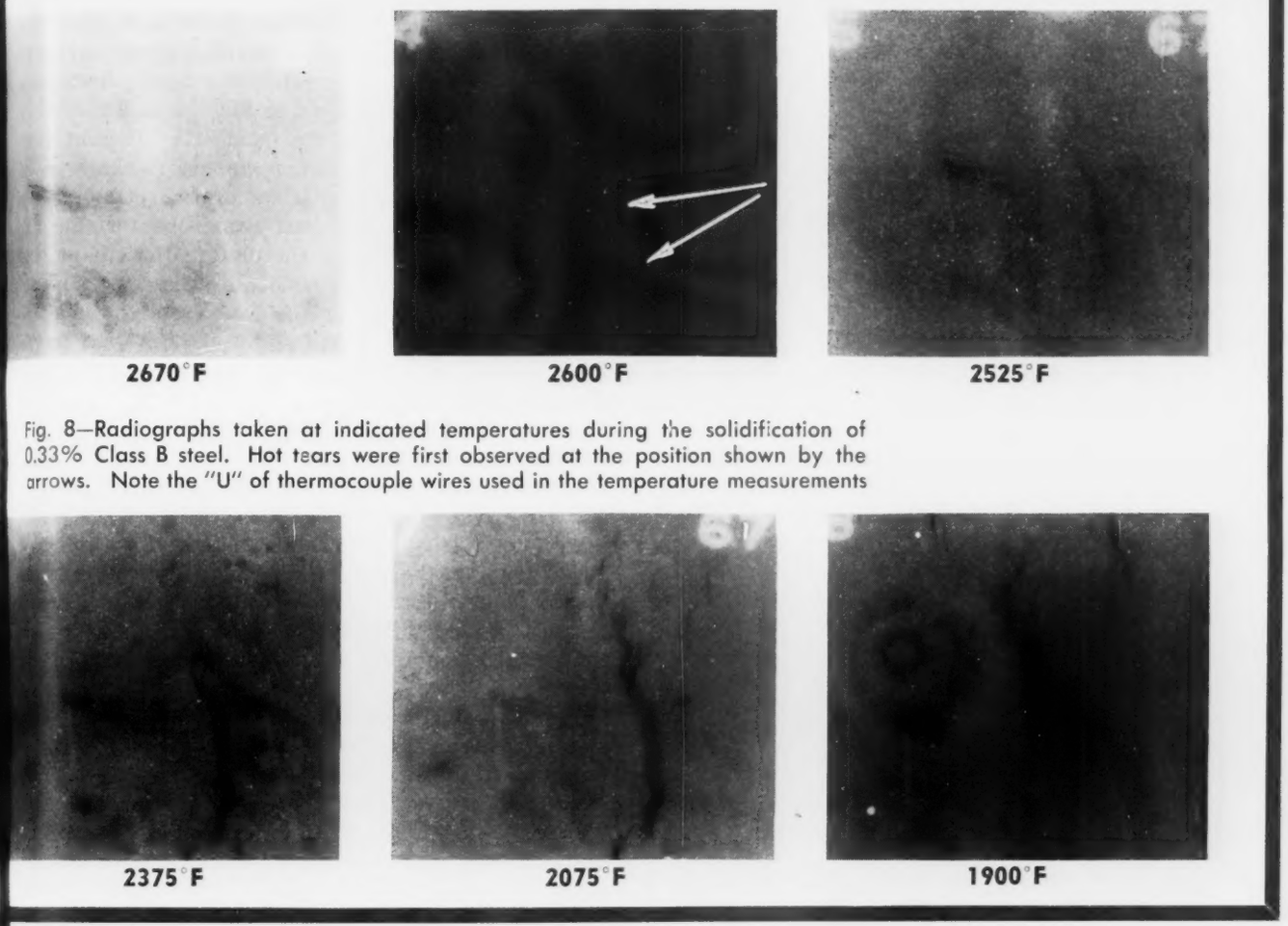


Fig. 8—Radiographs taken at indicated temperatures during the solidification of 0.33% Class B steel. Hot tears were first observed at the position shown by the arrows. Note the "U" of thermocouple wires used in the temperature measurements

steels no longer tore. This was accomplished by reducing the length of the test casting from 24 to 16 inches and by eliminating the horizontal chills and restraining bars between the flanges. The end chills were retained in order to produce an early solidification and rigidity in the flanges. The actual steps taken in the development of a test casting having a hot tearing tendency slightly below that required to produce tears in the base analysis clearly illustrate the effects of mechanical variables.

The restraining bars were first removed to reduce the level of restraint; this had little effect on hot tearing, indicating a high level of restraint by the sand. Next the horizontal chills were removed to decrease the time-rate of contraction of the solid zone; this resulted in an appreciable decrease in hot tearing. Finally, the length of the casting was reduced to 16 inches to decrease the amount of total contraction; this final change was sufficient to completely eliminate hot tearing. These variations in the mechanical condition did not effect the *temperature* of hot tearing as determined by the previously described method.

The shortened test casting was then poured with steels to which phosphorus or sulphur was added. Abnormally high quantities were included to aggravate the effects produced by these elements so that clear-cut trends would be indicated. It was found that each of these elements produced tears in the shortened castings, but the tears began at a temperature approximately 50-75°F below the solidus (Fe-C) temperature. The temperatures at which the two critical radiographs were taken in each of the tests are indicated on the iron-carbon diagram, Fig. 9.

In this respect, it should be noted that the hot tearing of commercial steels of relatively high (.06-.09 per cent) sulphur contents does not occur at Fe-Mn-S eutectic temperature (approx. 1700°F) as is commonly believed. Even with extreme segregation and low

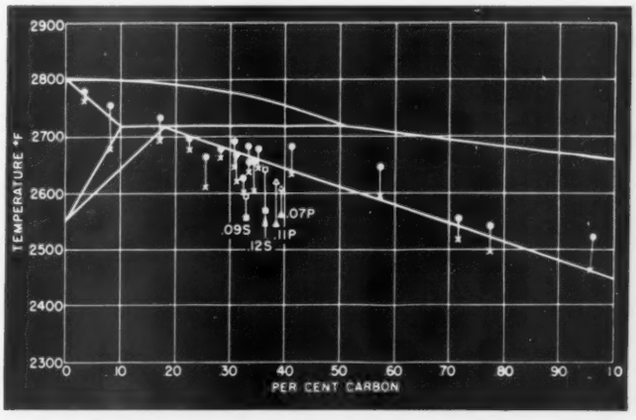


Fig. 9—Hot tearing temperature range for steels of various carbon contents, also steels with sulphur and phosphorus additions. Each low point is temperature at which a hot tear was first noted; high point is temperature at preceding radiograph

surface tension effects which should be expected to accentuate the film condition, it does not appear feasible to obtain essentially continuous films of 30 per cent S (eutectic content, required for the existence of liquid films at 1700°F) from such small initial contents in the liquid metal.

The fact that approximately .03 per cent S is soluble in austenite at 2000°F provides an added consideration supporting this contention. It should be expected that the suppression of the temperature of liquid film stage resulting from sulphur-rich segregates should follow a "false solidus" curve similar to that due to the eutectic segregates of the lead-antimony alloy. Accordingly, the stated amounts of sulphur should be expected to produce a moderate decrease in the film stage temperature and accordingly in the temperature of hot tearing.

Strength Tests of Solidifying Steel—To determine the time and rate at which steels acquire strength during solidification, 3-inch-diameter tensile bars were cast into the system shown in Fig. 10, and loaded in tension after cooling in the molds for different time intervals required to develop known thicknesses of solid skin. The mold consists of two strong cores fitted into a round, two-part flask, one forming the cope, the other the drag. Circumferential ribs on the cope and drag halves provide the necessary grip action required to transfer the load from the sand to the casting. The drag half of the flask is fixed to the floor, while the cope half is attached to a crane through a SR-4 weigh bar.

As the load is applied to the casting the cope is lifted away from the drag and the casting fractures near the mold parting line. The load necessary to cause fracture is measured by means of a direct reading photoelectric potentiometer connected to the SR-4 strain gage on the weigh bar. Such tests were made on .25-.30 per cent C steels containing less than .02 per cent S and .02 per cent P, and also on similar steels which contained additions of sulphur and phosphorus.

The strength data obtained from these tests are plotted in Fig. 11. The cooling cycles at four locations along the midplane of the test bar as well as the "start of freeze" and "end of freeze"[3] curves deduced from the cooling cycles are also shown so that the relation of casting strength to the condition of solidification can be observed. The nature of the fractures obtained at various time intervals shows a close correspondence to the thermal predictions of the solidification state.

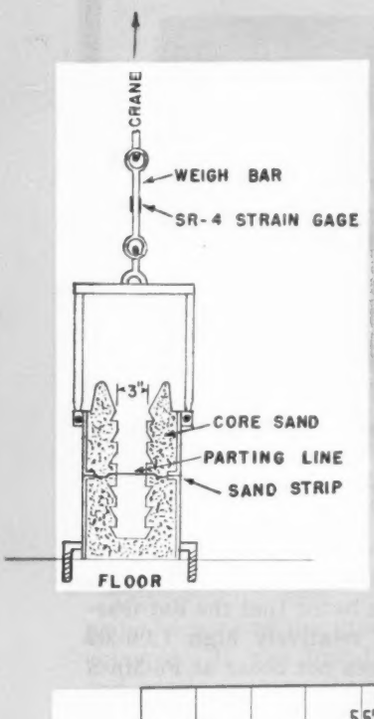


Fig. 10 — Sketch of apparatus used for measuring the rupture strength of a solidifying steel

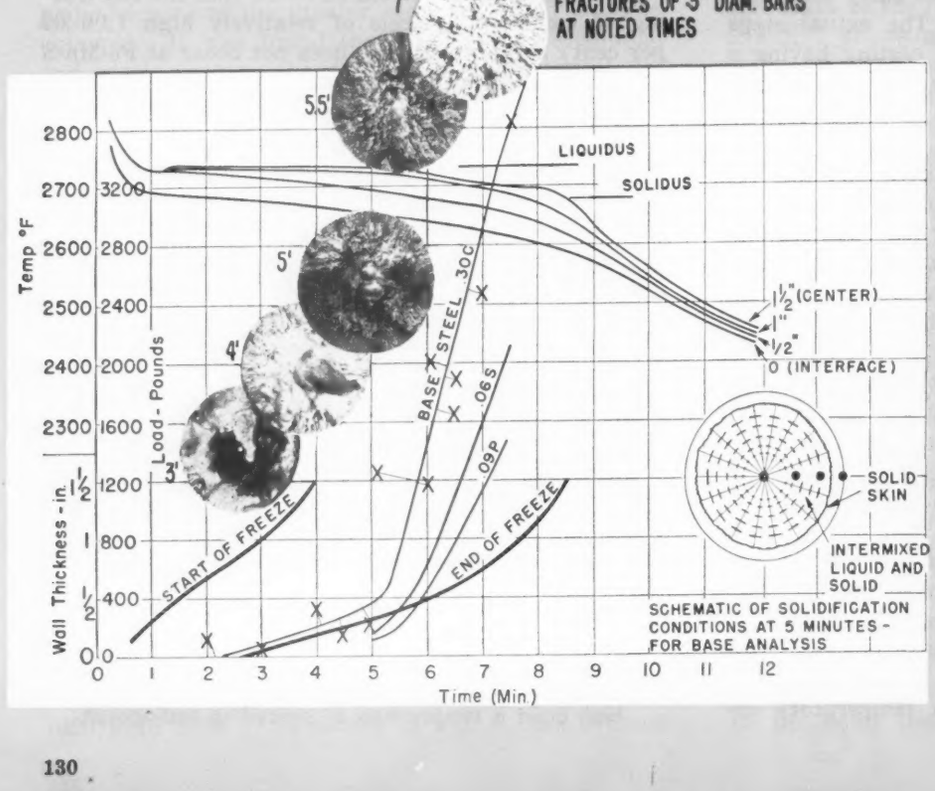


Fig. 11 — Correlation of rupture strength, Class B steel, with solidification shows: Appreciable strength develops only after completely solid skin forms; and strength-delay effects of S and P additions result from extending the liquid film conditions

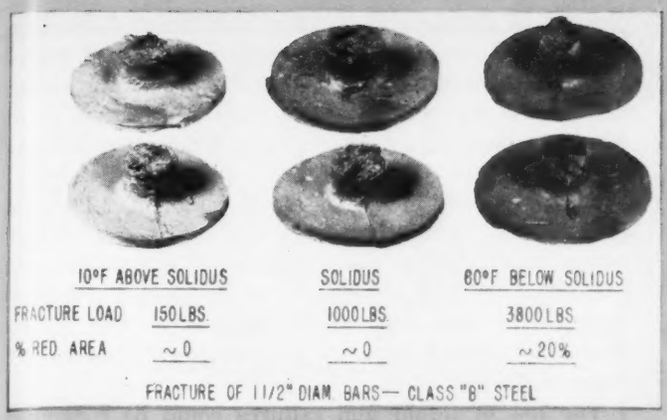

10°F ABOVE SOLIDUS
SOLIDUS
60°F BELOW SOLIDUS
FRACTURE LOAD 150 LBS. 1000 LBS. 3800 LBS.
% RED. AREA ~0 ~0 ~20%
FRACTURE OF 1 1/2" DIAM. BARS— CLASS "B" STEEL

Fig. 12—Rupture tests of 1½-in.-diam bars. Use of smaller bars permitted rupture of completely solid metal by load transfer through sand system. It also shows high load bearing capacity of restrained sand

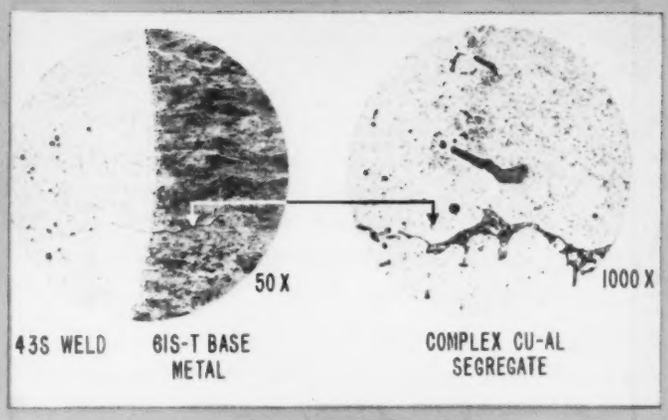


Fig. 13—Hot cracking of aluminum alloy weld metal and heat-affected zone (HAZ) resulting from liquefying of low-melting segregate material in base metal. Note evidence of weld metal penetration along cracks in the HAZ

It can be seen that the load-bearing capacity of the cast bar of base analysis is virtually nil until a solid skin, as indicated by thermal analysis data, begins to form. Thereafter, the load-bearing capacity rises rapidly and at a time that ¼-inch of solid skin has formed, approximately a 400-lb load is required for rupture. At the time ¾-inch of solid skin has formed the fracture load of the ¾-in.-thick ring is approximately 4000 lb. (Sand core fractures occurred above this level.)

It can be noted that the effect of sulphur and phosphorus additions is to delay the time at which steel acquires complete coherence. For example, the time at which steels containing added sulphur and phosphorus acquire a strength of 400 pounds is delayed for approximately one minute, and at comparable times during the remainder of the solidification these steels are inferior in strength to the base steel. It is interpreted that the strength delay effect of these elements results from the development of liquid film segregates which effectively produce a lowered solidus temperature; the effect is the same as noted previously for the case of the "false" solidus of the lead-antimony diagram determination.

In order to develop sufficiently high loads which could be supported by the sand and still result in rupture of the steel when below the film stage temperature, smaller bars (1½-in. diam) were tested with the results shown in Fig. 12. It is observed that 60°F below the solidus temperature the fracture is of a ductile appearance and that considerable reduction of area has occurred. These tests clearly indicate that low strength and ductility at temperatures considerably below the solidus cannot be considered as a factor leading to hot tearing, as commonly believed.

Non-Foundry Types of Hot Tearing:

Weld "Hot Cracking"—Liquid film formation on heating not only provides a convenient laboratory method for the determination of solidus temperatures but also a major source of difficulty in the field of welding. Fig. 13 illustrates examples of "hot cracks" which are developed in weld zones. Such cracks may occur in the weld only, in both the weld and the heat affected zone (HAZ) or only in the HAZ. It is now known that the HAZ type of hot cracking is developed as the result of the liquation of grain boundary segregates in the region which borders the fusion line of the weld. The development of hot cracks in the weld depends on the same factors which determine the hot tearing of castings. Fig. 14 presents a schematic illustration of the process of combined hot cracking of HAZ and weld. As the liquid pool behind the arc passes the segregate region melting occurs between the grains; the lateral distance from the weld which develops melting is determined by the thermal gradients perpendicular to the weld.

The top figure illustrates that grain boundary melting occurs to the distance at which the gradient temperature corresponds to the solidus temperature of the segregate film; fusion of the grain occurs at a temperature somewhat higher than the solidus of the grain. At this stage, the HAZ zone is in a state of compression due to the thermal expansion of the hot metal near the fusion line. As the arc passes on, cooling ensues with consequent contraction of the HAZ, resulting in the development of a separation (opening up) of the film region which produces the HAZ crack. At this point the weld metal is in a mushy condition and hot tearing is not possible (to be discussed). At a later time the weld metal reaches film stage and a strain concentration (notch-like effect) is developed at the HAZ crack position. Thus, the natural shrinkage strain developed by cooling of the weld is concentrated at the HAZ crack point with consequent development of a hot tear in the weld, which is essentially a continuation of the HAZ hot crack.

Insofar as the base metal itself is concerned, hot cracking may be prevented by hot working to break up the continuity of the segregate, alloy modification to eliminate the segregate, or by developing a fine grain size so as to scatter the segregate. If hot

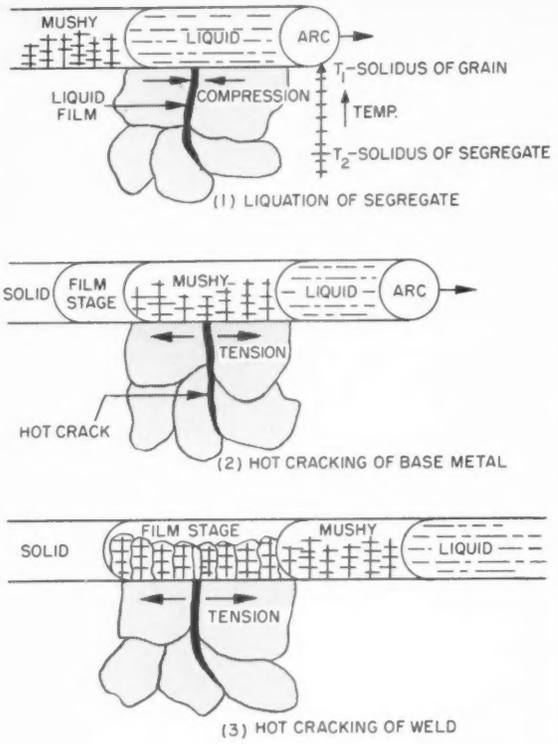


Fig. 14—Schematic illustration of the process of weld hot cracking of type shown in Fig. 13

cracks are eliminated from the base metal, the tendency for hot cracking of the weld is greatly diminished since the small accentuated hot spot and strain concentration created at the apex of the HAZ crack at the fusion line of the weld are eliminated. However, hot cracks may occur in the weld alone because of the extension developed in the portion of the weld which is at film stage by the contraction of colder regions.

Hot cracking of welds is greatly accentuated by the presence of segregates; sulphur and phosphorus are highly critical elements in this respect. One of the most serious problems of weld hot cracking entails "notch extension cracking" of supercharger rotors. Fig. 15 provides a schematic illustration of this form of hot tearing and a comparison with the case of hot tearing of castings at points of strain concentration and accentuated segregation. It is significant that the process of hot cracking of welds may be described in terms of conventional foundry terminology for hot tearing of castings, but this should not be surprising, inasmuch as welding represents a specialized form of casting.

"Burning," "Hot Shortness" and "Tenderness"—Metal which is undergoing a forging operation will disintegrate if liquid films are present. Such films may be developed due to overheating to solidus temperatures or simply due to the presence of low melting segregates. In general, the former case is termed "burning" and the latter "hot shortness." Burning is usually a question of improper heating or of too great a reduction which results in overheating by the process of deformation. "Hot shortness" is a more serious problem since very small amounts of tramp elements such as sulphur, lead, etc. depending on the metal, may completely prevent hot working in cases where forging is restricted to a narrow range of temperatures.

Extensive research has been conducted on this problem by the forging field; one of the most recent advances entails the use of rare earth metals to eliminate low melting segregates in stainless steel forgings. It is interesting to note that rare earth metals also have proved effective for the prevention of hot tears in steel castings.

The list of liquid film failures could be continued and many other terms added to the family of hot tearing. In soldering and brazing, for example, the joint is said to be "tender" immediately after becoming visually solid. In splicing lead cable the joint may be "wiped" and adjusted when mushy but must be handled with care during the "tender" period when solidification has reached liquid film stage.

Strain Theory of Hot Tearing—It is apparent that "film-stage fracture" is the common element of various forms of hot tear fractures encountered at temperatures near the complete solidification point of metals. It should be noted that there is a general agreement in these various manifestations of hot tearing that segregates of lower solidification point than the matrix material tremendously increase the probability of hot tearing. On first analysis this appears most anomalous, for all alloys regardless of the presence of segregates pass through a film stage. Clearly, there is a most important question as to why the segregate liquid films should be so much more effective than the liquid films developed at the true solidus.

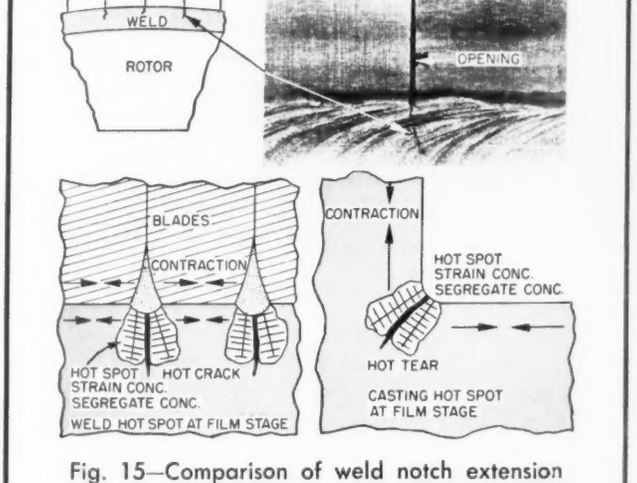


Fig. 15—Comparison of weld notch extension cracking to casting hot tearing. A hot spot and consequent concentration of segregate materials and strain result in hot tearing (hot cracking) as metal reaches film stage

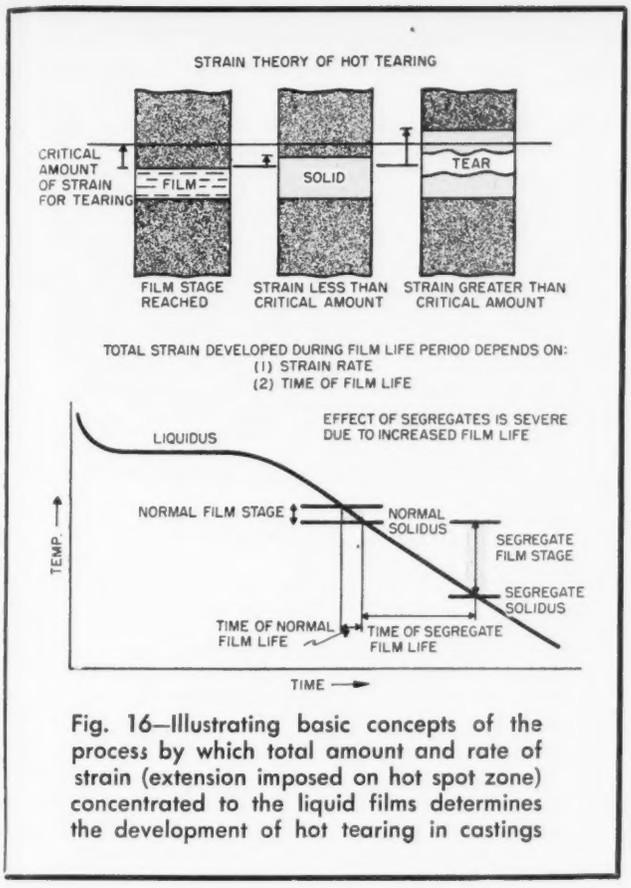


Fig. 16—Illustrating basic concepts of the process by which total amount and rate of strain (extension imposed on hot spot zone) concentrated to the liquid films determines the development of hot tearing in castings

An answer to this question is given by the "strain theory of hot tearing" which has been evolved at this laboratory. The strain theory provides a generalized explanation of the mechanism of hot tearing in terms of the time-rate of the extension developed in the liquid film regions. According to this theory the liquid film provides the metal condition which *permits* hot tearing; however, the actual *occurrence* of hot tearing is determined by mechanical factors inherent to the rate of extension per unit time imposed on the short time as may be deduced from the rapid drop in liquid film regions. Under nonsegregate conditions the metal passes through the film stage in a very short time as may be deduced from the rapid drop in temperature at the end of solidification shown by thermal records. Film stage time under these conditions may be measured in terms of seconds. Under segregate conditions (sulphur in steel, for example) the liquid film condition exists for much longer times which may be measured in terms of minutes, since the films exist over a wider temperature range. Accordingly, rates of extension which do not develop sufficient separation of the film to cause fracture in the time of a few seconds may be fully effective in the time of several minutes, for the separation developed in the films is *additive* with time. Fig. 16 illustrates the theory schematically.

It should be noted that this theory covers hot tearing in all the forms which have been described. Thus, the cooling curve plot of Fig. 16 may be used to illustrate the effect of strain on casting and weld hot tearing (downward progression on the plot) and of HAZ cracking, hot shortness, burning, solidus determination fracture, etc. (upward progression on plot)—in other words all that is necessary is the reversal of the time scale for the types which occur on heating.

The rate of extension of the film regions per unit time may vary widely due to a number of factors. The following factors contribute to high rates of extensions, hence to the development of hot tearing:

1. Long regions undergoing contraction.
2. Fast cooling of regions undergoing contraction.
3. Narrow hot spot regions undergoing extension.

The longer the region undergoing contraction and the faster its cooling, the greater the contraction developed *for each unit of time.* Inasmuch as a compensating extension of equal magnitude must be developed in the hot spot, it follows that the narrower the hot spot the greater will be the unit extension developed in unit time for a given rate of contraction of the colder regions. This explains why Hall[4] could eliminate hot tearing in his test bars by lengthening the bulb which formed the hot zone; increasing the length of the bulk served to decrease the effective strain rate of the hot spot.

Slow rates of cooling of the hot spot have an important effect per se, which is the same as the effect of the wider temperature range developed by segregate films, inasmuch as a slow-cooling hot spot provides a longer time interval for the building up of the extension to high values. (*Please turn to page* 192)

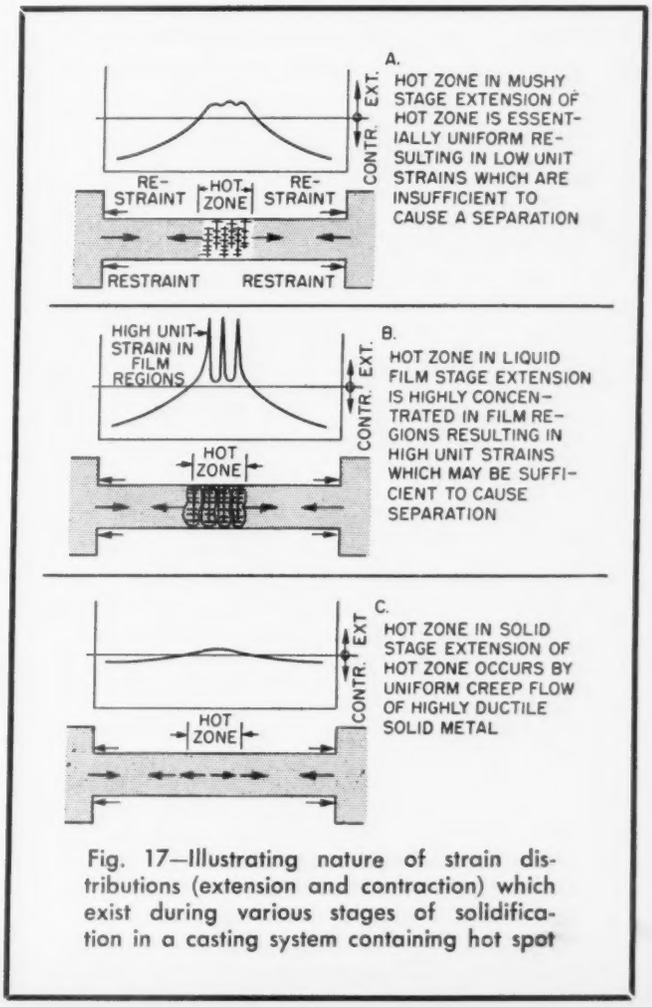

A.
HOT ZONE IN MUSHY STAGE EXTENSION OF HOT ZONE IS ESSENTIALLY UNIFORM RESULTING IN LOW UNIT STRAINS WHICH ARE INSUFFICIENT TO CAUSE A SEPARATION
CONTR. EXT.
RE-STRAINT
HOT ZONE
RE-STRAINT
RESTRAINT
RESTRAINT
B.
HIGH UNIT STRAIN IN FILM REGIONS
HOT ZONE
HOT ZONE IN LIQUID FILM STAGE EXTENSION IS HIGHLY CONCENTRATED IN FILM REGIONS RESULTING IN HIGH UNIT STRAINS WHICH MAY BE SUFFICIENT TO CAUSE SEPARATION
C.
HOT ZONE IN SOLID STAGE EXTENSION OF HOT ZONE OCCURS BY UNIFORM CREEP FLOW OF HIGHLY DUCTILE SOLID METAL
HOT ZONE

Fig. 17—Illustrating nature of strain distributions (extension and contraction) which exist during various stages of solidification in a casting system containing hot spot

QUESTIONS

Rolls crush sugar cane . . . . . Gear teeth are porous

Mold collapsibility needed to prevent cracking

Outlines details pertaining to matchplate production

Make Hollow Sugar Mill Roll

QUESTION Our firm operates a foundry in Colombia using an acid-lined electric furnace, and now we are supposed to make hollow rolls for a sugar refinery. They are 30 in. OD, 14 in. ID, and 36 in. long; weighing about 2 tons. Material from which they will be made is a synthetic iron containing 3.20 to 3.30 per cent TC and 2.2 per cent Si. We have not had any experience making such castings, and would like to have information on position in which to pour the casting, location of sprues, risers, etc.

ANSWER You mention that the rolls are to be made with an iron containing 2.2 per cent Si, but not whether that is what the customer specifies or your own idea. For a section 8 in. thick this Si content is more than three times what should serve—that is around 0.60 per cent. You do not state how the synthetic iron is to be made, but use of plenty of steel scrap will bring the silicon down.

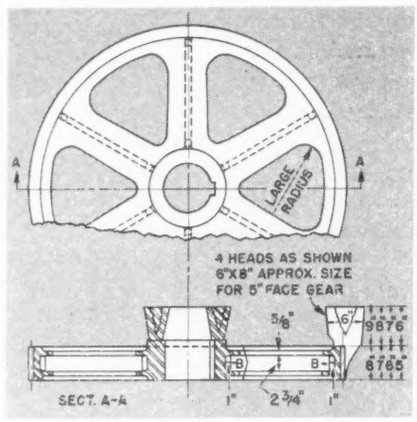
The roll should be poured in a vertical position, and in this way the height of the casting can be increased 4 to 6 in. to form the riser or feeder which later is cut off during machining. Gating is through a ring of pop gates around the top, midway between the inside and outside surfaces of the roll. We believe that eight 1-in.-diam holes equally spaced should be satisfactory.

Use of several slab cores across the runner ring which do not reach the bottom will aid when it comes to breaking it up. It should be pointed out that the molds forming the body of the roll should be dried thoroughly to eliminate any possibility of blowing, etc. The runner ring can be green sand, but it may as well be dried also.

Prevent Gear Teeth Porosity

QUESTION When the teeth are cut in the face of some large steel blank gear wheel castings we find porous areas and, in some instances, shrinkage cavities at the root of the teeth. We have tried various types of risers but so far without satisfactory result. Can you suggest a remedy?

ANSWER The manner in which the master mechanic of an eastern steel plant solved a similar problem is shown in the accompanying



Riser dimensions shown at right are made to suit corresponding measurements of the gear face

illustration and is submitted for your consideration.

Four risers, dimensions as shown on the sketch, were placed on top of the rim. From a point about half way up, each riser was extended downward on a slant to the lower edge of the casting. Thus the riser served as a direct feeder on top and as a reinforcing pad on the face of the wheel. On the inside of the rim, a small core B between each pair of adjoining arm cores prevented the formation of a hot spot and consequently shrinkage. A similar core was placed at the junction of each arm with the hub. In this instance the H-type arms were formed by dry sand cores.

The problem first was brought to this individual's attention several years ago with a simple steel casting used as a stretcher between two side frames on a cinder car. Twelve of these castings in succession broke along side the center rib, where a weak porous area had been created by the uneven section. The rib was removed from the pattern—result, no more broken castings. The same condition applies to many steel castings where unequal sections prompt the molder to use chills and cut ribs. The small cored hole through the rib on the double arm gear solves the problem.

Cast Steel Pots Show Cracks

QUESTION We cast various pieces similar to those shown in the accompanying drawing, and the first ones were molded as indicated in Fig. 1. Although they did not show any exterior defects, they cracked on the bottom when they were placed in service. Assuming that these cracks were due to contraction, succeeding castings were molded as shown in Fig. 2, with the riser in the center and the thickness modified to obtain directional solidification. In these castings cracks appeared due to the intense heat in the interior and exterior surfaces, some of which are indicated on the sketch. Can you tell us how to make the castings so as to eliminate the defects, and whether the composition employed is suitable?

ANSWER While troubles with lead and other metal melting pots or kettles often are due to users' abuse—such as improper setting or mounting and firing—we believe that in your case the difficulty arises from the method of manufacture. Through your procedure you have a nasty cope lift to make, and the cumbrous affair of cope bars and gaggers employed is far

ANSWERS

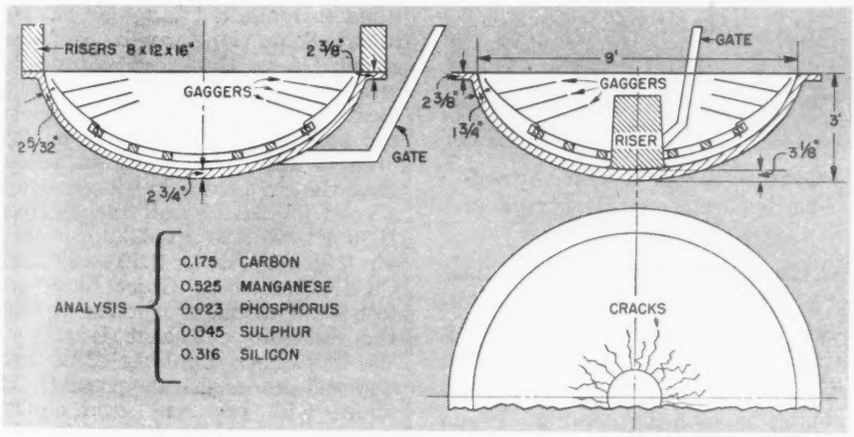
from being readily collapsible—a characteristic essential for proper solid contraction of the casting. By making a change in the method of molding to be described shortly you will eliminate those conditions and also make the whole proposition easier all around.

Molded bottom up, the drag is made with only a thin layer of sand next to the pattern—the inside of the mound being filled with coke, cinders or other coarse, open material. The cope then would not be too hard to lift, and the bars, etc., would not oppose contraction since the casting would pull away from rather than toward them. We would use a head in the center somewhat smaller than shown in Fig. 2, and would gate into the flange which now is at the bottom. The gate should enter the flange at a tangent instead of straight in, to provide a swirling action to the metal as it enters the mold cavity. If possible, use two ladles in pouring. That will permit filling the mold cavity more rapidly as well as with hotter metal.

Use two gates, one on each side, entering tangentially in the same direction. Also, we would make some provision to cut the gates off as soon as they set or solidify, to prevent tearing as the casting shrinks or pulls away from the gate. By molding a cutting bar into the cope—aimed at the gate—and extending above the top of the cope, it can be driven down with a sledge hammer a few minutes after pouring ceases, and the gate is cut off neatly.

As the kettle or pot is thicker in the middle of the bottom than at the edges, directional solidification will take place. As soon as the metal shows in the head or riser, pouring through the gate should be stopped, and hot metal poured into the riser instead. Let the casting remain in the mold until below a red heat, and then remove it to an annealing furnace where it is heated to 900°C and then slowly cooled to relieve contraction stresses. The head then can be cut off with a torch. After cleaning the casting should again be annealed at 900°C for 4 hr at temperature, and cooled slowly.

As to composition, we would increase carbon to 0.25 per cent and manganese to 0.70 per cent, since we believe less difficulty will be encountered in obtaining sound castings than with the low-carbon, low-manganese composition.



Difficulty encountered with cracking of lead melting pots undoubtedly is due to hindered contraction resulting from the molding procedure

Matchplates in Plaster Molds

QUESTION For our foundry in Australia we are trying to obtain all possible information on pressure-cast pattern plates. We followed the procedure mentioned in the report of the British Productivity Team but ran into trouble and would like to have information on the following:

Best mixture of plaster and talc or asbestos to prevent cracking during subsequent drying. Quantity of water for mixing. Mold drying temperature as well as time. Method, if any, of testing dried mold for moisture. Best stripping or parting agent. Pouring temperature of molten aluminum, and is mold heated for pouring? Best air pressure to apply. Are vents necessary or is mold porous enough? Thickness of asbestos diaphragm.

In trials we used 4 lb plaster and 1 lb powdered talc (french chalk) mixed with warm water to a cream consistency which was poured over the pattern. Drying for approximately 24 hr was done at 300 to 572°F, and plaster cracked badly. Aluminum was poured at high temperature and quite fluid. Air pressure applied was about 7 psi. Casting was good except for fins from the cracks.

ANSWER While you are using the generally accepted mixture of 4 lb gypsum or plaster of paris and 1 lb talc—which should be mixed thoroughly in the dry state—we believe your trouble lies in the type of talc employed. In this country the material is termed fibrous talc, which is a fibrous steatite known as agalite, mined in New York state, and used mainly in papermaking. This material is added to the plaster to counteract the shrinkage occurring during the drying operation when the hemihydrate to the dead-burned form takes place. Hence, it is possible that you could eliminate the cracking now appearing by increasing the quantity of talc, but not up to the point where it interferes with the permeability of the mold. As a substitute for the talc we suggest you try vermiculite.

QUESTIONS ? ANSWERS

Amount of water for mixing may vary from 1.4 to 1.7 lb per lb of dry mix, and preferably should be warm. Plaster always is added to water, as you undoubtedly know. Tendency toward lumping may be alleviated by allowing the plaster to soak a few minutes before mixing. Mixing should be continued to creamy consistency, time for which will vary with the temperature and purity of the water. Best results are obtained by using water at a definite temperature (140 to 150°F) and a definite mixing time which is established by experiment. Water and plaster always should be used by weight.

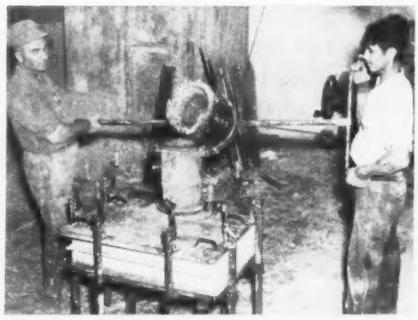
Mold drying temperature may be 400 to 1300°F; the higher the temperature the shorter the period, but usually for matchplate work the range is 400 to 500°, and in 18 to 20 hr the mold should be dry. Best method of ascertaining freedom from moisture is by thermocouple inserted in the center of the heaviest section of the mold, or by electrical conductivity. In the former the couple will not rise much over 212°F as long as water is present. For insurance, the temperature is allowed to rise to about 300° and held there for about ½-hr.

In the electrical conductivity method a meter which registers up to 2 million ohms is used with rigid leads or prods inserted to the center of the heaviest section, and as long as moisture is present current will be conducted between the leads or prods.

A variety of stripping or release agents can be used, such as liquid soap, 75 per cent kerosene and 25 per cent light oil with 1 per cent wetting agent (some soapless detergents may serve), ¼-lb stearic acid dissolved in 1 pint kerosene, 50 per cent dilution of wax-water emulsion used for coating linoleum, 50-50 mixture of petroleum jelly and kerosene. Coating should be as thin as possible to obtain sharp impressions in the mold.

Since plaster molds are good insulating mediums, the aluminum does not need to be raised to as high a temperature as in the case of sand casting, and from 1250 to 1275°F should suffice. If air pressure is employed to force the metal into the cavity, the aluminum is allowed to remain in the pouring sleeve until it attains what is termed the "mushy" stage. Air pressure ranges from 4 to 7 psi. Molds can be filled by gravity alone by puncturing the asbestos diaphragm (1/16-in. thick) with a rod. When that method is used the metal temperature should be higher than when pressure is employed.

Molds should not be permitted to stand for any length of time after drying, since they tend to absorb moisture. Preferably they are cooled slowly in the oven to 150°F, removed, assembled and poured as soon as possible. Molds do not need any additional venting since the permeability of the material and the openings between joint faces permit the air to escape rapidly.



Gypsum cement is molding medium for pressure-cast matchplates

Dimensions for Small Cupola

QUESTION We are planning to start a foundry and are wondering if you can give us the dimensions for a cupola with a 30-in. shell. We would like to build one for our first operations.

ANSWER Numerous details with reference to cupolas and their operation may be found in the *Handbook of Cupola Operation.*

Briefly the following pertains to a cupola with a 30-in. shell: The shell is ⅜-in. steel plate from bottom plate to the charging doors, and ¼-in. plate above. From tuyeres to charging doors the distance should be about 15 ft. Legs should be about 5 ft high to permit easy access for chipping and patching the lining. Windbox may be made of ⅛-in. plate from 10 to 12 in. wide and 3 ft high. Tuyeres should be about 20 in. above the bottom plate, using a 4-in. sand bottom.

The well area (16 in. deep) will hold around 560 lb iron or two charges. Coke splits are 35 lb. Four tuyeres, 4¼ in. high and 5 in. wide, should give a suitable ratio for cross-sectional areas of tuyeres and the well. Slag hole may be 4 to 8 in. below the bottoms of the tuyeres.

Iron Resists Shock and Wear

QUESTION We operate a small shop melting about 2 tons per hour in a 26-in. cupola with 320-lb iron charges and 40-lb coke splits. We hope to make a triangular casting about 8 in. long on a side and about 1¼-in. thick. Resistance to wear and shock are the properties desired. About 550 Bhn is right for hardness but we have no figures to indicate toughness except that the following has been doing a good job with an oil quench from 1600°F: C 3.20 to 3.30 per cent, Mn 0.55, Si 0.80, Cr 1.50 to 2.0, and Cu 1.0 per cent. Object is to obtain comparable properties without the necessity of heat treatment. We have been thinking of an iron with C as high as possible, Si about 0.55 per cent, and adding 4.5 Ni and 2 Cr in the cupola. Would there be any special casting difficulties with such metal and might we expect the desired hardness with good toughness? Can you tell us the approximate transverse strength and any additional information?

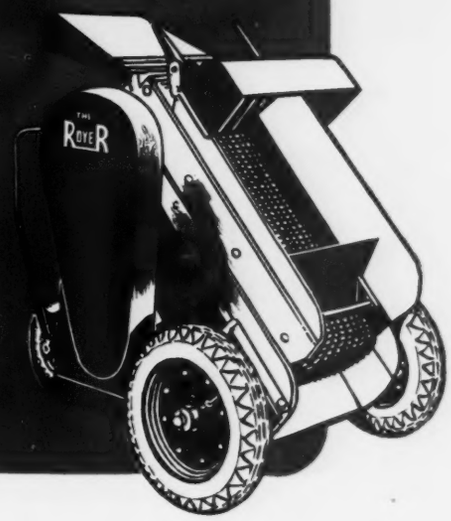
ANSWER The material you mention is a product known as Ni-Hard, and was developed by International Nickel Co. Inc., and we suggest that you get in touch with its representatives for full information relative to the material. Briefly, this alloy iron is produced in regular and high-strength grades.

The regular has the following composition range: TC 3 to 3.6

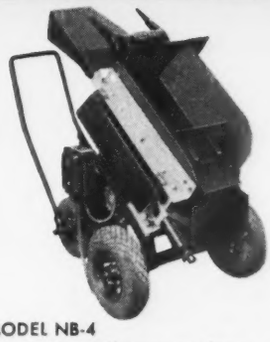
(*Concluded on page* 138)

TO MEET YOUR REQUIREMENTS FOR CONDITIONED SAND

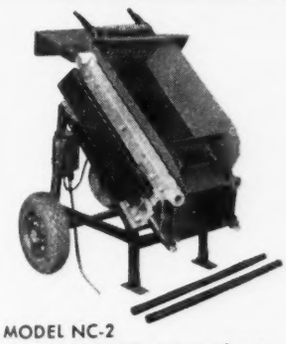
Economically...



THE ROYER JUNIOR
4 to 7 tons per hour

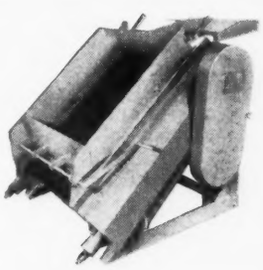


MODEL NB-4
7 to 9½ tons per hour

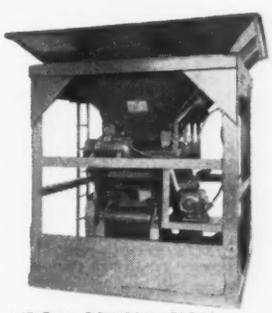


MODEL NC-2
12 to 15 tons per hour

MODEL NDP
20 to 25 tons per hour



MODEL NYS
60 to 100 tons per hour



NDC-M COMBINATION
20 to 25 tons per hour

. . . use Royer Sand Preparation equipment. Whatever your capacity needs may be, a Royer or combination of Royers can supply the demand, quickly and economically. From 4 to 100 tons of molding sand per hour, depending on the model, can be prepared at one-half the cost of manual conditioning. This operating economy is only part of the savings you make. Because of the proper conditioning of your molding sand you will have fewer rejects due to blows and run-outs and the smoother surfaces will reduce cleaning and grinding time.

All models from the small Junior (4 to 7 tons per hour) to the NYS (60 to 100 tons) give you the six point conditioning—thorough refuse removal; positive lump breaking; complete blending and mixing; even distribution of moisture; increased permeability; double aeration. The finished product is an open, velvety textured sand—ready for the molder's use.

More than 8000 Royers are in use today in foundries everywhere—large and small—jobbing or production—preparing properly conditioned sand for true-to-pattern molding.

Investigate the possibilities for these cost-cutting machines in your plant. Our Bulletin 744, sent on request, gives complete information on sizes and models available.

ROYER FOUNDRY & MACHINE CO.
159 PRINGLE ST., KINGSTON, PA.

QUESTIONS ? ANSWERS

(*Concluded from page* 136)

per cent, Si 0.4 to 0.7, Mn 0.4 to 0.7, P max. 0.40, Ni 4 to 4.75 and Cr 1.4 to 3.5 per cent. Brinell hardness cast in sand ranges from 550 to 650; transverse load on 1.2 x 12-in. bar is 4000 to 5000 lb, and Izod impact strength is 20 to 30 ft lb.

The high-strength type has the same composition except that the C content is 2.90 per cent max. Brinell hardness ranges from 525 to 625; transverse load from 4500 to 5500 lb, and Izod impact strength from 25 to 35 ft lb. With both types of iron the castings should be stress relieved at 400 to 500°F on the basis of one hour per inch of section thickness.

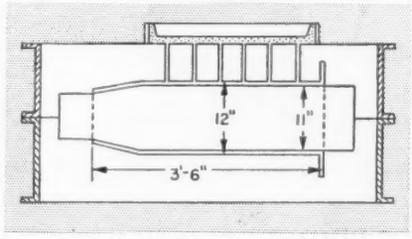
With good cupola practice you should have no difficulty in producing a good product. There will be no loss of nickel added to the charge, and use of ferrochromium briquets will give good recovery of chromium.

Silicon Bronze Bearing Leaks

QUESTION We have tried various combinations of gates and risers on a naval sleeve bearing 3 ft 6 in. in length, 11 in. ID at one end and 8 in. ID at the other end, and with a square flange at the large end. The metal is silicon bronze and the casting must be leak-proof. Up to the present we have not been successful. We shall appreciate an expression of opinion on the problem.

ANSWER Since the casting leaks irrespective of the types of gates and risers employed, we are inclined to the opinion that some other factor is responsible for the defect. The casting is plain and thin and of fairly uniform metal thickness. Therefore it should solidify in a uniform manner with no tendency for one part to draw metal from another or adjoining part, with resultant porous structure or noticeable cavities.

This line of reasoning leads to the conclusion that the mold, or core, or possibly both, causes the metal to flutter more or less and thus produce a leaky casting. Style of gate and manner of introducing the metal, also large risers, are of no avail if the metal does not lie quietly in the mold. For satisfactory result the mold should be dried, or at least skin dried and vented with a wire in the vicinity of the square end flange. The core should contain a minimum amount of binder, be dried thoroughly and have a 3-in. vent passage through the center. The vent passage should be connected with suitable outlet



Metal from pouring basin on top of cope enters the mold through row of small pop or pencil gates

to the atmosphere outside the flask.

A simple and economical gating system outlined in the accompanying freehand sketch includes a long, narrow pouring basin on top of the cope, six ¾-in. pop gates extending from basin to mold cavity, and a small show-up riser, or flowoff at each end.

Mix Borings With Coke Split

QUESTION We have been experimenting with a process of using steel and cast iron shavings in the cupola. Shavings are added mixed with the coke charge and the coke charge is reduced. Silicon carbide also is added. Claims made for the process were that it resulted in economy and also produced a better quality of casting. We found that results did not justify the claims, and we would like to have any information of any other foundry which has experimented with the process, and the results obtained.

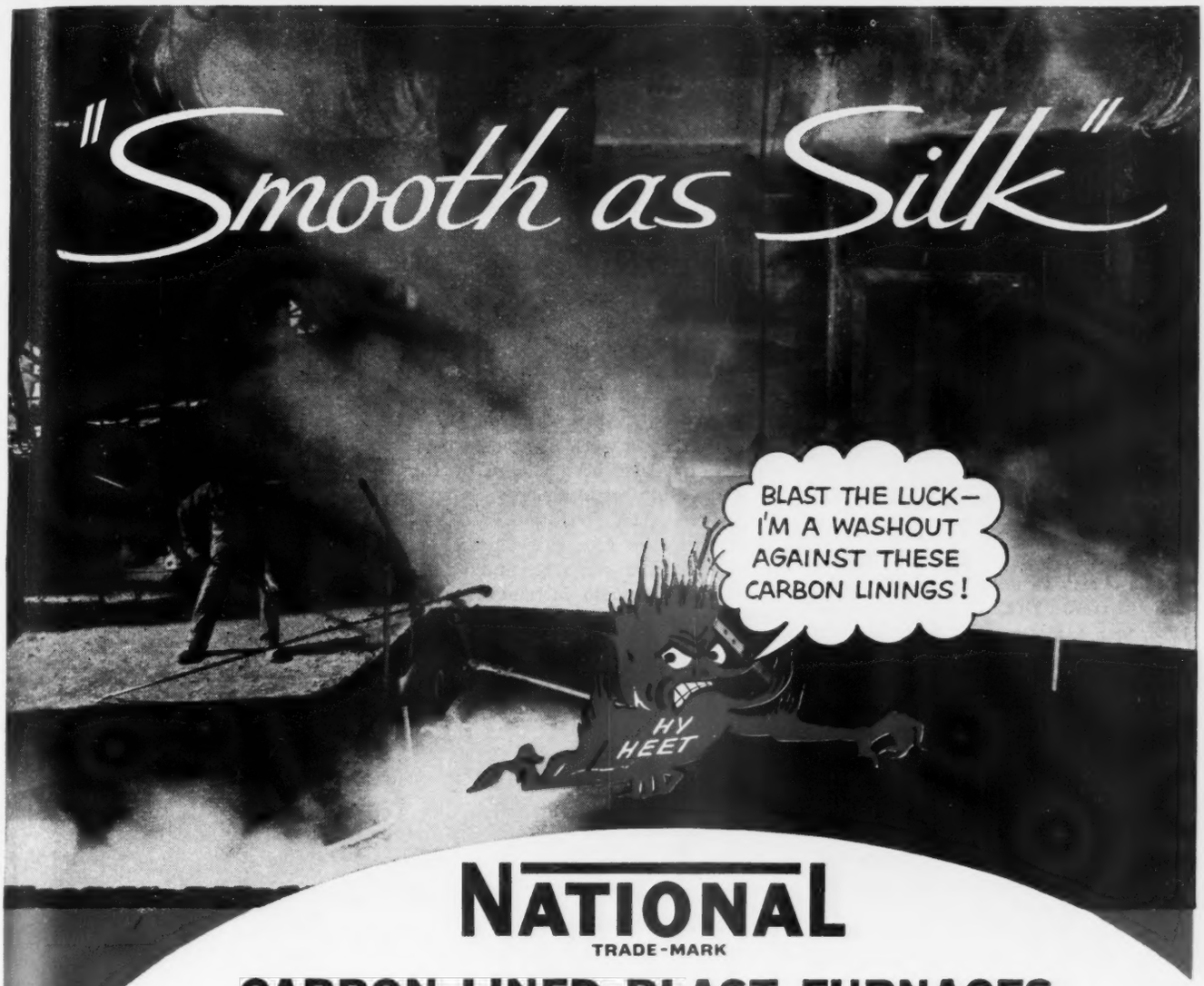
ANSWER We do not recall having heard or read of the particular procedure you mention for reclamation of borings, but we believe that the results you obtained are about what one would expect. With present-day coke the foundryman has enough trouble without cluttering it up with borings. We cannot see why there should be any coke economy since borings do not supply any heat; rather they absorb it.

Possibly the silicon carbide might supply some heat after ignition, due to oxidation of the silicon, but coke is cheaper. Perhaps the claimant for the process meant calcium carbide instead of silicon carbide, since work by Carter indicates that its use provides higher temperatures, or reduction of coke to maintain a given temperature. However, we believe that use of calcium carbide is only effective in the basic-lined cupola.

While references have been made from time to time of foundrymen shoveling in 5 to 10 per cent borings without any ill effects on the resulting iron, general consensus is that it is not good practice since the large surface area of the borings compared to the volume leads to considerable oxidation during melting. An article in the British *Foundry Trade Journal* (Mar. 20, 1952) in discussing reclamation of borings by melting alone after the regular day's heat, mentions a melting loss of 15 per cent even with the blast cut from 3000 cfm to 1000 cfm.

Most recent device for reclaiming borings is one that injects the raw borings into the cupola at the melting zone. Apparatus was described in the July issue of FOUNDRY, and good recovery without detrimental effect on the resulting iron is claimed for the method.

The British article mentioned indicates that cost of reclaiming borings by shoveling in is about $23 a ton while if the borings are made into briquets by mixing with portland cement and then melted, the cost is about $30 a ton. In this country cost of briquetting, using pressure machines, is around $2 a ton. Initial cost of such equipment is high, of course, but where borings are available to keep the machine in constant use such cost can be amortized within what may be considered a reasonable period.



NATIONAL
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CARBON-LINED BLAST FURNACES

TYPICAL of the many comments favoring carbon-lined furnaces after the recent strike, was that made by the manager of a large eastern mill.

Describing his carbon hearths as coming back on blast "smooth as silk", he joins the many other users reporting faster, easier, more economical return to normal operation with carbon lined furnaces than with any other type of lining.

MORE THAN 30% OF ALL U. S. BLAST FURNACES ARE NOW LINED WITH "NATIONAL" CARBON!

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point to "Eveready" No. 1050 Industrial Flashlight Batteries . . . delivering twice as much usable light as any battery we've ever made before. Their unique construction prevents swelling or jamming in the case . . . has no metal can to leak or corrode.

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MEN of Industry

W. SUMMERFIELD BRUNK, president, Headford Bros. & Hitchins Foundry Co., Waterloo, Iowa, was recently elected president of the National Foundry Association. Mr. Brunk, following graduation from Drake University in 1928, was athletic coach, high school instructor and owner of a business school in Creston, Iowa. He went to the Philippine Islands in 1931, continuing his activities as high school instructor, athletic coach and high school principal. In 1934 he entered the production field as manager of Philippine Paper Products Co., Manila. Returning to the United States in 1940, he became associated with Headford Bros. & Hitchins Foundry Co. a year later, became assistant to the president in 1943, vice president in 1945, and has been president since 1948. Mr. Brunk is a former president of Cedar Valley Foundrymen's Association and is currently chairman of the Iowa-Illinois group of the Gray Iron Founders' Society.

♦ ♦ ♦

William W. C. Ball, recently elected vice president of the National Foundry Association, is vice president-general manager and a director, Taylor & Fenn Co., Hartford, Conn. Mr. Ball joined the company following graduation from high school in 1915. He became foundry manager in 1931, vice president and a director in 1938, and was appointed general manager in 1944. A director of the Gray Iron Founders' Society, he is also a member of the Gray Iron Foundry Advisory Committee, Office of Price Stabilization, and is a former member of the board of governors of the Connecticut Foundrymen's Association.

♦ ♦ ♦

Frank X. Bujold, formerly divisonal controller, has been named manager of foundries for Ford Motor Co.'s Engine and Foundry Division, in charge of activities of the Dearborn iron and specialty foundries, Cleveland foundry, jobbing foundry and manufacturing engineering department of foundries. Mr. Bujold, who joined the Ford company in 1949 as controller of Dearborn iron foundry, became controller of the Engine and Foundry Division last year.

♦ ♦ ♦

Dr. John Chipman, head, Department of Metallurgy, Massachusetts Institute of Technology, was recently honored by the American Society for Metals as recipient of the 1952 Sauveur Achievement Award which recognizes pioneering metallurgical achievements. Dr. Chipman, outstanding for his work in process metallurgy, has also been chosen by the Italian Metallurgical Society as winner of the 1952 Losana Gold Medal for making the greatest contribution to international research and co-operation in the field of metallurgical engineering.

Gerald D. Strong, formerly general manager, has been appointed president, Homer Furnace & Foundry Corp., Coldwater, Mich.

♦ ♦ ♦

C. J. Masepohl has been appointed works manager, Calumet Steel Castings Corp., Hammond, Ind. Mr. Masepohl has been associated with the company since 1937. **W. F. Jicha,** with the company since 1938 and formerly foundry superintendent, has been named general superintendent.

♦ ♦ ♦

Walter Edens has been named supervisor of melting and foundry research, Allis-Chalmers Mfg. Co., Milwaukee. Mr. Edens, who has had more than 15 years experience in the metal field, was associated successively with the Heil Co., Ampco Metal Inc., and Badger Brass & Aluminum Foundry Co., all of Milwaukee, and Alloy Engineering & Casting Co., Champaign, Ill., prior

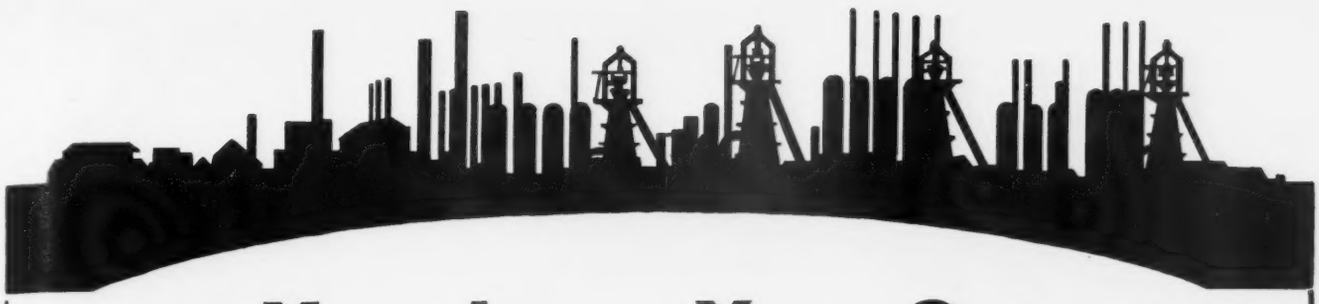
(*Continued on page* 142)

W. SUMMERFIELD BRUNK
. . . heads National Founders

WILLIAM W. C. BALL
. . . vice president, NFA

FRANK X. BUJOLD
. . . Ford foundry manager

DR. JOHN CHIPMAN
. . . receives ASM award



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Birmingham, Alabama

(Continued from page 140)

to joining Allis-Chalmers. He is a past president of the Wisconsin Chapter of the AFS and of the Milwaukee Chapter of the American Society for Metals.

♦ ♦ ♦

A. S. Blodget Jr. has been appointed Pittsburgh district manager, Air Reduction Sales Co., New York, succeeding the late S. D. Edsall. **E. S. Twining Jr.**, formerly assistant sales manager of the company's Philadelphia district, succeeds Mr. Blodget as manager of the Boston district.

♦ ♦ ♦

Robert G. Ruark has been named executive assistant to the president, Corn Products Refining Co., New York. Mr. Ruark joined the company in 1944 as director of sales research for the Chemical Division, and since 1948 has been at the Argo, Ill., plant, where he was assistant general manager of the division.

♦ ♦ ♦

L. F. Hansen has been appointed director of industrial relations, National Metal Trades Association, Chicago. For the past 4 years Mr. Hansen has been manager of the Associated Industries of Oshkosh, Wis.

♦ ♦ ♦

D. E. Moody has been named president of Canefco Ltd., Canadian subsidiary recently established by the Electric Furnace Co., Salem, O., with headquarters at 137 Wellington St., W., Toronto 1, Ont. The new company will design, erect and put into operation fuel fired and electrically heated furnaces and auxiliary equipment in collaboration with the parent company. **K. U. Wirtz**, president of Electric Furnace Co. in Salem, has been named vice president of Canefco Ltd., and **H. E. Farintosh**, secretary-treasurer.

R. L. BERNHARD
. . . with American Blower

JOHN H. SIBBISON JR.
. . . fire clay sales

R. L. Bernhard has been named manager of the centrifugal compressor department recently established by American Blower Corp., Detroit, with its own design, engineering and research staff. Mr. Bernhard, a graduate of University of Alabama, has been in the centrifugal compressor field for over 18 years.

♦ ♦ ♦

Fred W. Scott Jr. has been appointed manager of the merchandising sales division recently established by the Carborundum Co., Niagara Falls, N. Y. Mr. Scott was graduated from Cornell University and joined the company in 1938. He has served as sales engineer, Detroit area industrial salesman and more recently as sales manager of the coated products division.

♦ ♦ ♦

George W. Roper has been named assistant technical director of the Dust and Fume Control Division, American Wheelabrator & Equipment Corp., Mishawaka, Ind. Mr. Roper, who joined the company over 6 years ago as a sales engineer, has recently been project engineer.

John H. Sibbison Jr. has been appointed sales engineer, American Fire Clay & Products Co., Canfield, O. Mr. Sibbison was graduated from Case Institute of Technology and was previously associated with Malleable Founders' Society, Cleveland, and the Inland Steel Co., Chicago. His most recent connection was with Superior Foundry Inc., Cleveland, where he was chief metallurgist.

♦ ♦ ♦

Robert J. Painter has been elected executive secretary, and **Raymond E. Hess** associate executive secretary and editor in chief, American Society for Testing Materials, succeeding the late C. L. Warwick. Following graduation from Rensselaer Polytechnic Institute, Mr. Painter taught there for a period and later was associated with Bethlehem Steel Co. He joined the ASTM staff in 1931, became assistant secretary in 1946 and earlier this year assumed additional duties as treasurer. Mr. Hess, a graduate of University of Pennsylvania, became a member of the ASTM staff in

(Continued on page 144)

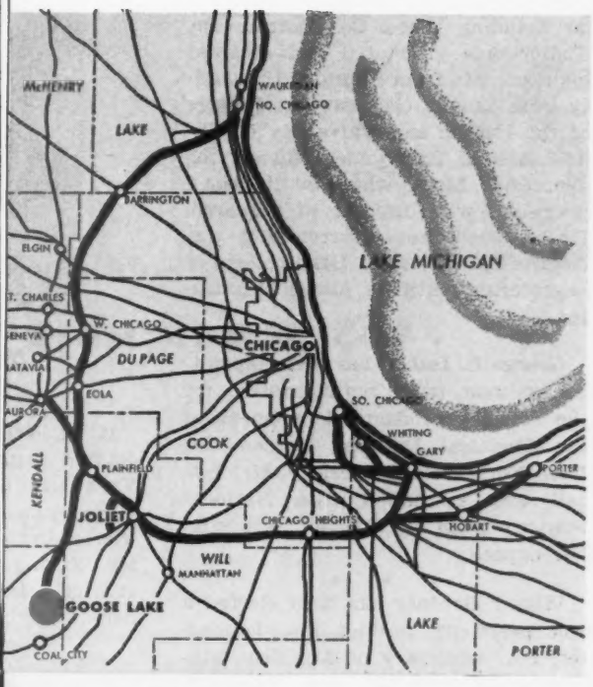
H. E. FARINTOSH
. . . Canefco Ltd. executive

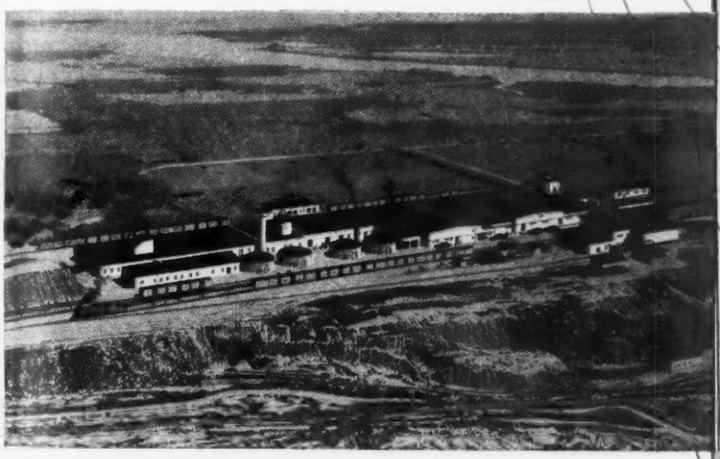
D. E. MOODY
. . . president, Canefco Ltd.

K. U. WIRTZ
. . . vice pres., Canefco

ROBERT J. PAINTER
. . . exec. secretary, ASTM

ILLINOIS CLAY PRODUCTS HAS ALL 3





1 Central Location

The Illinois Clay Products Company, Goose Lake Plant, is located near Joliet, Illinois—only 55 miles from Chicago. Above is a map showing the excellent shipping facilities provided by the Elgin, Joliet & Eastern Railway—the Outer Belt Line.

2 Ample Supply and Modern Plant

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Chem-Brix
Pat. Applied for
CHEMICALLY BONDED REFRACTORIES

GOOSE LAKE
FIRE CLAY BRICK AND CLAYS

3 Quality Products

For over 40 years, Illinois Clay Products Company has maintained high standards in quality and uniformity. Research and development have led to constant improvements and new products such as Carbon and Hi-Silica Chem-Brix.

THERM-O-FLAKE
HIGH TEMPERATURE VERMICULITE INSULATION

Illinois Clay Products Company

SINCE 1911 JOLIET, ILLINOIS

(*Continued from page* 142)
1920 and most recently has been assistant executive secretary and editor.

♦ ♦ ♦

Dr. Samuel S. Kistler has been appointed research associate, Peninsular Grinding Wheel Co., Detroit. Dr. Kistler was graduated and received his doctorate from Stanford University. He taught chemistry at College of the Pacific and University of Illinois, and in 1935 joined Norton Co., Worcester, Mass., where for the last 4 years he was director of research. He resigned from Norton and was dean of University of Utah college of engineering until he joined Peninsular.

♦ ♦ ♦

George E. Isabell has been appointed midwest sales representative for the foundry products department of the Chemical Division, Borden Co., New York. Until recently Mr. Isabell was associated with National Foundry Sand Co., Detroit, in a similar capacity.

♦ ♦ ♦

Wilbur Gardner has been elected a vice president, DeWalt Inc., Lancaster, Pa., subsidiary of American Machine & Foundry Co., New York. Mr. Gardner joined the company in 1925 and has been treasurer since 1937 and secretary since 1941. He will continue in these positions.

♦ ♦ ♦

John Hellstrom has been appointed director of all sales of American Air Filter Co., Louisville, and its Herman Nelson Division, Moline, Ill. The latter's sales and advertising departments will be moved to Louisville. Mr. Hellstrom, vice president of American Air Filter Co., will return from San Francisco, where he organized and managed the company's Pacific Division. **Robert W. Nelson,** vice president, formerly of the Herman Nelson Division, will assist Mr. Hellstrom.

R. H. FILSINGER JR.
. . . *Pittsburgh sales, Vanadium*

R. H. Filsinger Jr. has been appointed Pittsburgh district manager, Vanadium Corp. of America, New York, succeeding **John B. Girdler,** who recently became sales manager. Mr. Filsinger was formerly eastern district sales manager for the company.

♦ ♦ ♦

P. B. Croom, chairman of the Texas Chapter of the AFS for 1952-53, is owner of Houston Pattern Works, Houston, Tex. Mr. Croom served an apprenticeship in patternmaking with Lufkin Foundry & Machine Co., Lufkin, Tex., and worked as patternmaker in several pattern shops, including 4 years with Hughes Tool Co., Houston. He entered University of Texas after this period and was graduated in 1937. For two years he was associated with Aetna Casualty & Surety Co., and worked as production engineer, Cameron Iron Works, Houston, from 1939 to 1944, when he acquired Houston Pattern Works. Mr. Croom has been active in the Texas Chapter and was its vice chairman last year.

JOHN J. WATSON
. . . *Bartlett & Snow sales*

John J. Watson has been appointed manager of foundry sales, C. O. Bartlett & Snow Co., Cleveland. Following graduation from Case Institute of Technology, Mr. Watson spent two years with Thompson Products Co., Cleveland, and joined Bartlett & Snow in 1937. He was transferred to the Detroit office in 1945 and has been manager there for several years.

♦ ♦ ♦

Gordon E. Bouvier has been named manager of a new office recently opened at 705 Bloor St., west, Toronto, Ont., by Eclipse Fuel Engineering Co., Rockford, Ill. To be known as Eclipse Fuel Engineering Co. of Canada Ltd., the new company will handle sales and service on products of the parent company in Canada including boilers, heat treating furnaces, air blowers, control valves, etc.

♦ ♦ ♦

Richard K. Schrecongost has been appointed manager of the die casting machinery division, Hydraulic Press Mfg. Co., Mount Gilead, O. Mr.

(*Concluded on page* 146)

JOHN HELLSTROM
. . . *AAF sales director*

P. B. CROOM
. . . *Texas Chapter chairman*

GORDON E. BOUVIER
. . . *Eclipse Fuel sales, Canada*

RICHARD K. SCHRECONGOST
. . . *Hydraulic Press manager*

Need Impact Strength?

TRIPLE SHOCK RESISTANCE

with

ALMAG 35

ALUMINUM ALLOY

For the first time....all vital properties in one alloy, as-cast.

As-cast, with *no heat treatment* or age hardening, standard sand cast 90° V-notch test specimens of ALMAG 35 produce average Charpy Impact results of 10.47 foot pounds . . . nearly triple the impact resistance of heat treated alloys previously recommended.

Shock resistance is only one of ALMAG 35's standout qualities; it also possesses the highest, most stable combination of strength, ductility, corrosion resistance, and dimensional stability of any *as-cast* aluminum alloy.

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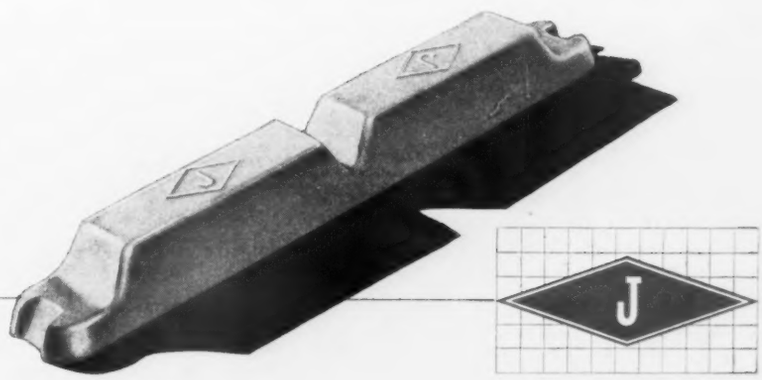
SPECIFICATIONS:
MIL-A-10935-6-7



U.S. Patent No. 2564044.

WILLIAM F. JOBBINS INCORPORATED

AURORA P. O. BOX 230 **ILLINOIS**

(*Concluded from page* 144)

Schrecongost has been in the die casting field for 15 years, 9 years of which he spent with the die casting division of the Hoover Co., North Canton, O. Most recently he was plant manager., Pressco Casting & Mfg. Co., Chicago.

♦ ♦ ♦

Alvin A. Meyrowitz, vice president, H. Kramer & Co., Chicago, has been named general manager of its California Division plant, recently opened in El Segundo. Mr. Meyrowitz was graduated from Cornell University, took his master's degree from New York University Graduate School of Business, and his law work at George Washington University. He was associated with the copper industry for about 10 years through his work with government departments. Prior to becoming a vice president of H. Kramer & Co. last year, he was assistant director of the Copper Division, NPA Washington.

♦ ♦ ♦

Harold P. Yarian, until recently assistant chief metallurgist, Willys-Overland Motors Inc., Toledo, O., has been appointed chief metallurgist of its subsidiary, Wilson Foundry & Machine Co., Pontiac, Mich.

♦ ♦ ♦

A. L. Waite, for many years representative in the Los Angeles area for the Macklin Co., Jackson, Mich., has been appointed manager of all sales for the company on the West coast.

♦ ♦ ♦

A. N. Mason and **John K. Gillett** have been appointed sales representatives in metropolitan New York and northern New Jersey, for Michigan Oven Co., Detroit. Mr. Mason, a graduate of Drexel Institute of Technology, has been engaged in engineering sales, recently as New York sales representative of Industrial Ovens Inc., Cleveland, and Eclipse Fuel Engineering Co., Rockford, Ill. Mr. Gillett attended Carnegie Institute of Technology and Kenyon College. He has been engaged in sales work for a number of years with Ferro Enamel Corp., Atlas Car & Mfg. Co., Cleveland, and was vice president and sales manager of Industrial Ovens Inc., there. Messrs. Mason and Gillett will also represent Eclipse Fuel Engineering Co. in metropolitan New York.

♦ ♦ ♦

H. E. Fellows has joined Lester B. Knight & Associates Inc., Chicago, as manager of surveys. Mr. Fellows entered the foundry industry in 1920, and was associated with Sampson Tractor Co., Webster Electric Co., Racine, Wis., and Milwaukee Foundry Equipment Division, SPO Inc., Milwaukee. Since 1946 he has been engaged in designing special equipment and general foundry consulting work.

♦ ♦ ♦

Thomas C. Ballagh, export manager of the Tabor Mfg. Co., Philadelphia, left recently on a three-month trip in the Pacific area to visit installations of the company's molding and abrasive cut-off machines in Hawaii, the Philippines, Hong Kong, Formosa and Japan.

♦ ♦ ♦

H. S. Johnson has been appointed director of merchandising; **L. M. Atwood,** assistant general sales manager, and **J. H. Alsen,** director of engineering applications, Boston Woven Hose & Rubber Co., Cambridge, Mass. Mr. Johnson, with the company since 1936, will direct advertising, sales promotion and market research in the home office. Mr. Atwood, since 1948 western manager of the V-belt department in Cedar Rapids, Iowa, will supervise the general line field sales force. Mr. Alsen, who joined the company in 1920, will be responsible for application and sale of products to original equipment manufacturers.

♦ ♦ ♦

Robert G. Caldwell has been appointed Atlanta district office manager, Gardner-Denver Co., Quincy, Ill., succeeding **H. G. Little,** who has bought an interest in Central Machinery Co., Miami, Fla., distributor of Gardner-Denver's pumps, air compressors and other pneumatic products. Mr. Caldwell attended Northwestern University and has been in the company's Texas sales organization for 12 years.

ALVIN A. MEYROWITZ
. . . Kramer division manager

H. E. FELLOWS
. . . joins Lester B. Knight

ROBERT G. CALDWELL
. . . Gardner-Denver sales

W. C. van DYCK
. . . training assistant

W. C. van Dyck has been named assistant manager of education and training, Caterpillar Tractor Co., Peoria, Ill., where he will continue to direct the college graduate training program. Mr. van Dyck joined Caterpillar in 1938 after graduation from University of Vermont.

♦ ♦ ♦

L. F. Harding, formerly of Harding Engineering Co., Detroit, has joined the Detroit sales office of C. O. Bartlett & Snow Co., Cleveland. Mr. Harding will handle sales and engineering service on the company's line of foundry sand systems, dryers, coolers and other materials handling and processing equipment.

♦ ♦ ♦

William G. Cole has been appointed sales representative, Bohn Aluminum & Brass Corp., Detroit, with headquarters in the Chicago office. A graduate of Michigan State College, Mr. Cole joined the company in 1950 as an industrial engineer.

● How well you know that "sand is only part of the picture"? How well you know too, that a good core oil is a *must* in producing high quality castings. And that is how

SMITH L-O CORE OIL

gets into the picture. Smith L-O is the Dow-Therm processed oil — a process that produces a better oil. Better because it is thoroughly homogeneous—better because it is always of the same uniformity. Smith L-O is available in a wide range of grades to meet varying job conditions, type of metal cast, and type of sand used. Order this quality binder from the representative nearest you.

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- COLUMBIAN WAREHOUSE CO. Reading, Pennsylvania
- FOUNDRIES MATERIALS CO. Coldwater, Michigan
- FOUNDRY SERVICE CO. Birmingham, Alabama
- THE FOUNDRY SUPPLY CO., INC. Minneapolis, Minnesota
- F. F. SHORTSLEEVE Elmira, New York
- MALCOLM G. STEVENS Arlington, Massachusetts
- PACIFIC GRAPHITE CO., INC. Los Angeles 22, California
- ST. LOUIS COKE & FOUNDRY SUPPLY CO. *(formerly M. W. Warren Coke Co.)* St. Louis, Missouri
- WESTERN FOUNDRY SAND CO. Seattle, Washington
- WESTERN INDUSTRIAL SUPPLY CO. Portland 14, Oregon

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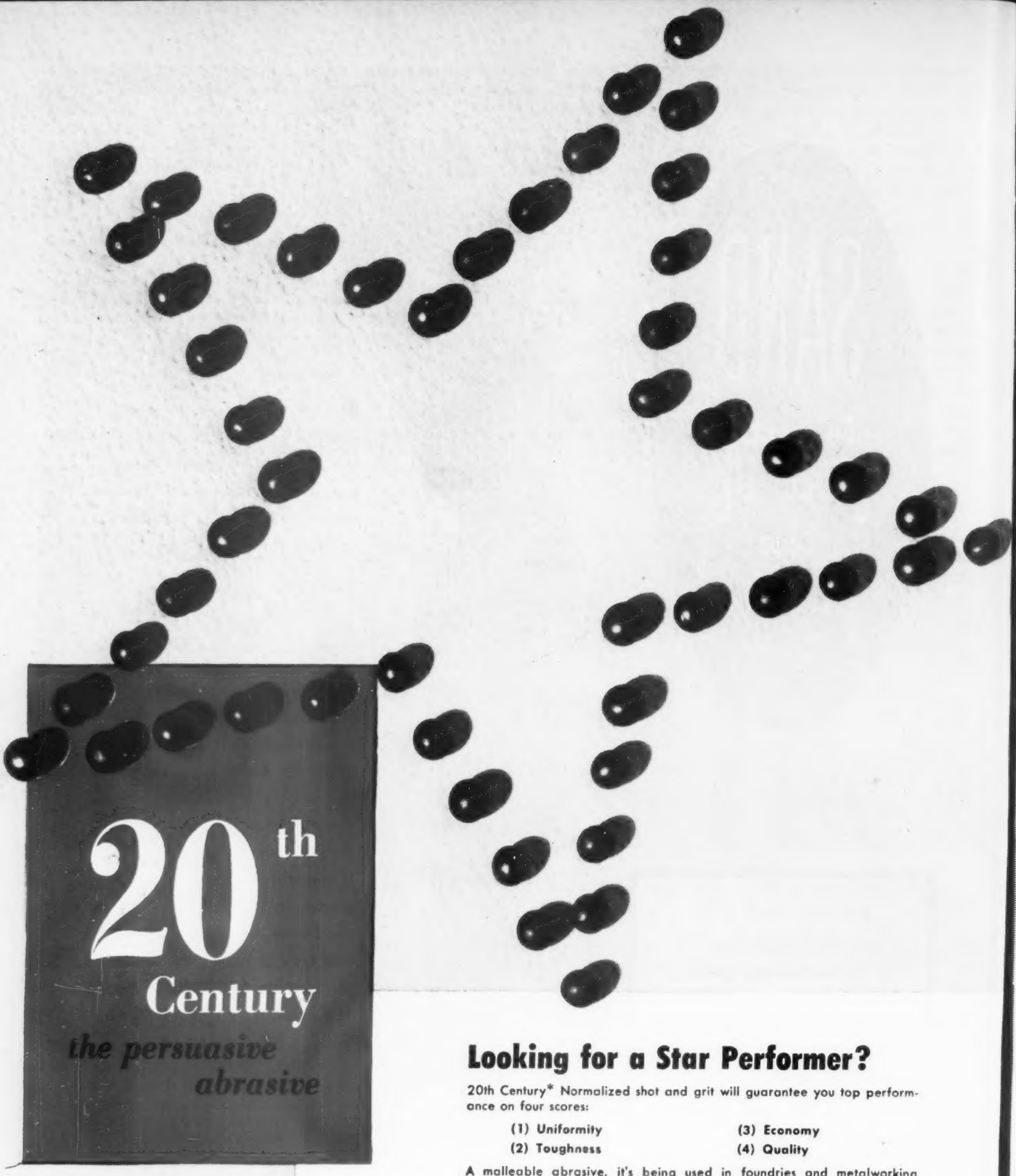
INDUSTRIAL OILS DIVISION . . . ROCKFORD, ILLINOIS



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One of the world's largest producers of *quality* shot, grit and powder
—Normalized—Hard Iron—Cut Wire

Foundry STATISTICS

Malleable Iron

(Shipments of castings—net tons[1])

	Shipments—Total	Shipments—For Sale	Unfilled Orders[2]
1950	920,502	512,192	.....
1951			
July	76,826	45,072	263,017
7 mo.	654,099	392,868	.....
Aug.	90,727	57,164	249,273
Sept.	82,276	48,568	244,575
Oct.	93,884	58,251	238,019
Nov.	88,210	53,682	220,740
Dec.	76,045	45,543	215,134
Total	1,085,241	656,076	.....
1952			
Jan.	87,003	54,988	202,799
Feb.	82,898	50,129	193,061
Mar.	80,960	49,084	196,896
Apr.	89,270	56,337	198,215
May	81,770	51,476	180,382
June	74,446	46,511	173,353
July	45,266	29,675	166,517
7 mo.	541,613	338,200	.....

Copper-Base Alloy

(Shipments of castings—1000 pounds[1])

	Shipments—Total	Shipments—Sand	Shipments—Perm. Mold	Unfilled Orders[2]
1950	1,056,973	953,590	55,614	.....
1951				
July	80,036	72,147	4,321	85,837
7 mo.	721,234	648,632	41,790	.....
Aug.	95,024	84,503	5,422	84,821
Sept.	89,567	79,676	5,493	84,611
Oct.	99,355	88,332	6,237	82,491
Nov.	92,102	82,270	6,043	82,667
Dec.	80,259	72,813	4,958	80,294
Total	1,177,541	1,056,226	69,943	.....
1952				
Jan.	89,616	80,376	6,233	78,316
Feb.	86,231	77,813	5,204	75,279
Mar.	88,642	79,437	6,182	72,463
Apr.	84,460	75,590	5,914	70,602
May	81,903	73,723	5,420	70,252
June	75,359	67,748	4,858	70,797
July	64,832	59,001	3,637	74,741
7 mo.	571,043	513,688	37,448	.....

Aluminum

(Shipments of castings—1000 pounds[1])

	Shipments—Total	Shipments—Sand	Shipments—Perm. Mold	Shipments—Die	Unfilled Orders[2]
1950	543,082	184,782	181,366	167,201	.....
1951					
July	34,483	13,514	9,493	10,459	117,018
7 mo.	335,375	122,194	110,002	97,152	.....
Aug.	45,207	17,813	14,452	11,767	117,888
Sept.	41,864	16,490	11,793	12,293	112,973
Oct.	45,419	17,694	13,495	13,049	110,382
Nov.	41,661	16,278	11,725	12,604	116,044
Dec.	40,907	16,202	11,262	10,891	110,249
Total	550,433	206,671	172,729	157,756	.....
1952					
Jan.	46,424	18,051	12,236	13,884	109,654
Feb.	44,847	17,451	13,445	13,012	110,327
Mar.	46,448	19,017	13,673	12,880	104,749
Apr.	49,824	19,451	14,631	14,482	104,004
May	47,752	18,317	14,292	13,907	100,802
June	45,310	18,452	11,982	13,860	103,685
July	40,106	16,342	10,866	12,356	106,673
7 mo.	320,711	127,081	91,125	94,381	.....

Magnesium

(Shipments of castings—1000 pounds[1])

	Shipments—Total	Shipments—For Sale	Unfilled Orders[2]
1950	15,224	13,310	.....
1951			
July	2,211	1,850	15,528
7 mo.	17,788	15,514	.....
Aug.	2,957	2,543	16,095
Sept.	2,551	2,306	16,407
Oct.	2,977	245	16,143
Nov.	3,946	2,954	15,550
Dec.	2,916	2,525	14,729
Total	33,135	28,596	.....
1952			
Jan.	3,560	3,083	14,047
Feb.	3,368	2,940	14,459
Mar.	3,319	2,972	13,279
Apr.	3,051	2,751	13,244
May	3,002	2,698	13,041
June	2,948	2,699	12,094
July	2,654	2,393	12,948
7 mo.	21,911	19,536	.....

Foundry Production Workers

Estimated Number

	July 1952	June 1952	July 1951
Gray Iron	.....	143,900	155,500
Malleable	.....	25,000	27,500
Steel	.....	64,200	63,100
Nonferrous	.....	93,700	88,400

Average Weekly Earnings

	July 1952	June 1952	July 1951
Gray Iron	$64.37	$68.20	$68.48
Malleable Iron	64.81	72.10	69.44
Steel	77.25	79.24	74.68
Nonferrous	73.74	75.58	71.94

Average Weekly Hours

	July 1952	June 1952	July 1951
Gray Iron	38.5	39.7	41.4
Malleable Iron	36.7	39.9	40.8
Steel	42.4	43.3	42.6
Nonferrous	40.1	41.1	40.9

Labor Turnover Rate (June)

(Per 100 employees)

	Total Accession	Total Separation	Quit	Layoff
Gray Iron	3.3	3.0	2.2	0.4
Malleable Iron	2.2	2.7	2.2	0.1
Steel	5.4	4.3	3.1	0.2
Nonferrous	5.6	5.0	2.3	1.5

Source: Bureau of Labor Statistics

Gray Iron Castings—Shipments

(Net tons[1])

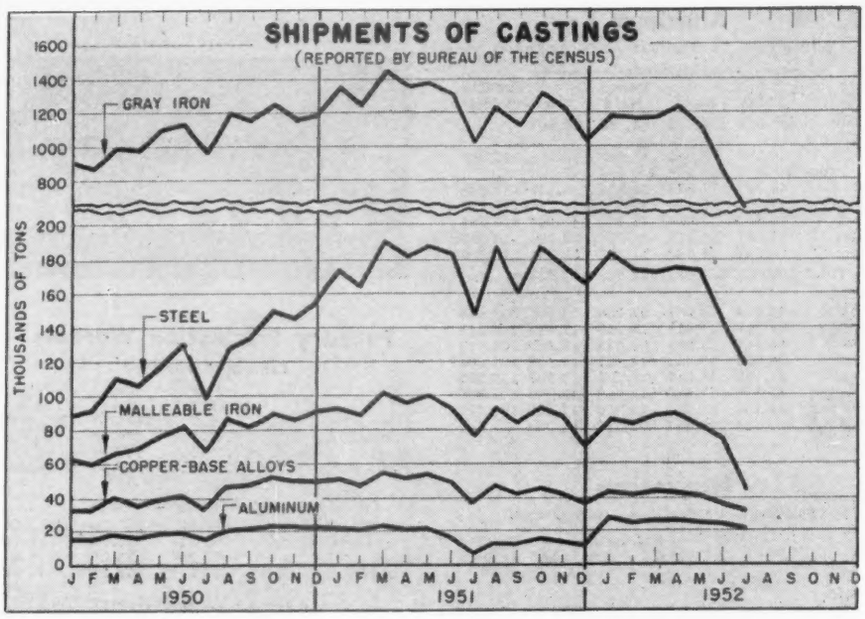
	All Castings—Total	All Castings—For Sale	Miscellaneous Castings—Total	Miscellaneous Castings—For Sale	Heavy Steel Ingot Molds—Total	Heavy Steel Ingot Molds—For Sale	Chilled Railroad Car Wheels—Total	Chilled Railroad Car Wheels—For Sale	Pressure Pipe & Fittings Total[3]	Soil Pipe & Fittings Total[3]	Unfilled Orders[2] Total
1950	12,905,562	6,880,352	8,117,748	3,415,261	2,308,661	1,043,590	514,074	456,402	1,203,762	761,317	.....
1951											
July	1,028,812	568,126	653,656	301,749	200,764	97,575	40,792	35,202	88,217	45,383	2,208,116
7mo.	9,136,621	5,140,068	5,888,184	2,743,890	1,514,790	734,110	400,877	349,682	876,846	455,376	.....
Aug.	1,218,832	697,952	779,838	378,042	222,721	109,257	50,127	44,507	115,284	50,862	2,144,587
Sept.	1,114,789	625,511	704,657	328,331	204,856	96,011	45,467	41,360	111,893	47,916	2,055,392
Oct.	1,301,681	732,764	815,815	382,405	244,556	115,738	53,172	46,483	130,636	57,502	1,983,307
Nov.	1,183,833	674,139	737,971	348,991	222,665	107,569	48,759	43,141	129,766	44,672	1,933,972
Dec.	1,032,799	582,614	646,352	309,696	204,911	94,857	41,504	38,119	108,767	31,175	1,847,065
Total	14,988,555	8,453,048	9,573,347	4,471,539	2,614,517	1,257,542	639,996	563,272	1,473,192	687,503	.....
1952											
Jan.	1,199,285	694,498	745,548	359,806	225,704	110,268	57,155	53,551	125,729	45,149	1,800,905
Feb.	1,155,143	654,833	733,067	348,885	219,261	105,918	50,444	47,649	107,669	44,712	1,766,434
Mar.	1,172,017	660,920	723,225	334,492	228,799	110,607	53,919	49,747	115,843	50,231	1,711,037
Apr.	1,204,801	652,962	773,538	347,121	204,805	85,239	48,506	42,650	117,929	60,023	1,614,426
May	1,100,630	620,049	698,332	317,150	186,998	91,980	44,229	39,848	117,586	53,485	1,459,305
June	835,263	502,322	616,895	292,846	19,467	10,575	44,066	44,066	103,335	51,500	1,445,521
July	636,213	431,961	427,547	227,866	14,794	10,223	40,783	40,783	94,850	58,239	1,409,684
7 mo.	7,303,352	4,217,545	4,718,152	2,227,806	1,099,818	524,805	339,102	318,294	782,941	363,339	.....

Steel Castings—Shipments

(Net tons[1])

	All Castings—Total	All Castings—For Sale	All Castings—Railway Specialties	Carbon Steel—Total	Carbon Steel—For Sale	Carbon Steel—Railway Specialties	Alloy Steel—Total	Alloy Steel—For Sale	Alloy Steel—Railway Specialties	Unfilled Orders[2] Total
1950	1,459,382	1,042,884	261,357	1,081,162	788,619	243,215	379,220	254,265	18,142	.....
1951										
July	140,317	100,141	27,565	106,684	78,034	24,516	33,633	22,107	3,069	929,978
7 mo.	1,180,496	866,587	280,678	905,019	684,257	249,815	275,477	182,330	30,763	.....
Aug.	177,096	128,981	41,763	130,913	99,732	36,086	46,183	29,249	5,677	944,211
Sept.	160,695	116,658	35,500	120,632	89,711	33,086	40,063	26,887	2,414	918,038
Oct.	189,929	139,963	39,984	138,610	104,449	36,488	51,319	35,504	3,496	891,508
Nov.	176,728	131,276	35,034	126,544	95,180	31,090	50,184	36,096	3,935	865,029
Dec.	165,110	123,448	33,213	119,762	89,298	29,341	45,348	34,150	3,872	846,436
Total	2,050,054	1,506,908	466,172	1,541,280	1,162,687	415,915	508,574	344,216	50,157	.....
1952										
Jan.	183,738	139,488	37,091	133,985	102,265	31,806	49,753	37,223	5,285	869,299
Feb.	174,626	133,602	31,719	125,484	94,969	28,251	49,142	38,633	3,468	856,872
Mar.	173,694	131,997	32,118	125,787	95,206	27,782	47,907	37,196	4,336	857,115
Apr.	175,075	134,325	33,549	126,628	97,128	29,798	48,447	37,654	3,751	842,970
May	173,635	132,129	35,227	125,309	95,816	30,995	48,326	37,129	4,223	804,695
June	141,628	114,410	30,455	101,850	84,388	26,815	39,778	30,818	3,640	846,459
July	119,036	97,633	20,752	81,576	67,600	18,694	37,460	30,329	2,058	855,046
7 mo.	1,141,432	883,584	220,991	820,619	637,372	194,141	320,813	249,466	26,761	.....

[1] Source: Bureau of Census. [2] All cast iron pipe is shipped for sale. [3] For sale only.



Index of Foundry Equipment Orders

Foundry Trades Only

(Net Orders Closed, New Equipment)

	1951	1952
Jan.	668.0	404.5
Feb.	638.6	200.4
Mar.	599.0	310.0
Apr.	490.1	385.1
May	431.7	225.2
June	393.2	353.8
July	390.3	343.9
Aug.	404.5	311.6
Sept.	346.5	....
Oct.	372.4	....
Nov.	305.5	....
Dec.	230.5	....

Note: Figures are percentages of the base period 1937-1939 taken as 100 per cent (monthly average). Source: Foundry Equipment Manufacturers Association.

Coke Production and Consumption

(Net tons*)

	Production	Consumption Total	Consumption By Foundries
1950	72,718,038	73,373,618	3,523,396
1951			
July	6,629,863	6,495,585	301,447
7 mo.	45,919,301	45,725,724	2,276,796
Aug.	6,768,161	6,674,495	299,027
Sept.	6,470,658	6,366,969	274,017
Oct.	6,742,767	6,727,211	292,737
Nov.	6,501,098	6,562,279	272,333
Dec.	6,738,759	6,821,446	249,490
Total	79,133,744	78,868,124	3,664,404
1952			
Jan.	6,804,106	6,760,011	261,148
Feb.	6,358,715	6,411,905	251,125
Mar.	6,779,639	6,743,944	264,488
Apr.	5,806,153	5,770,711	261,972
May	5,960,867	5,882,922	253,605
June	2,472,940	1,772,203	219,909
July	6,652,100	1,621,308	166,377
7 mo.	40,814,520	34,963,004	1,678,724

Ingot Brass and Bronze

(Shipments in net tons)

	1951	1952
Jan.	28,416	28,315
Feb.	27,168	24,211
March	31,997	23,890
Apr.	30,472	22,547
May	33,267	21,740
June	33,817	21,274
July	32,016	18,947
Aug.	25,285	21,807
Sept.	22,285	.....
Oct.	23,124	.....
Total for year	332,378	.....

Zinc-Base Alloy

(Shipments of castings—1000 pounds[1])

	Shipments—Total	Shipments—For Sale	Unfilled Orders[2]
1950	579,332	376,681	.....
1951			
July	37,564	26,014	85,028
7 mo.	251,916	165,012	.....
Total	494,950	328,183	.....
1952			
Feb.	34,307	23,006	70,034
Mar.	35,083	23,443	67,846
Apr.	37,312	23,741	63,753
May	35,775	22,410	62,397
June	33,829	21,433	60,719
July	23,480	15,737	57,666
7 mo.	271,642	176,177	.....

Pig Iron Production and Consumption

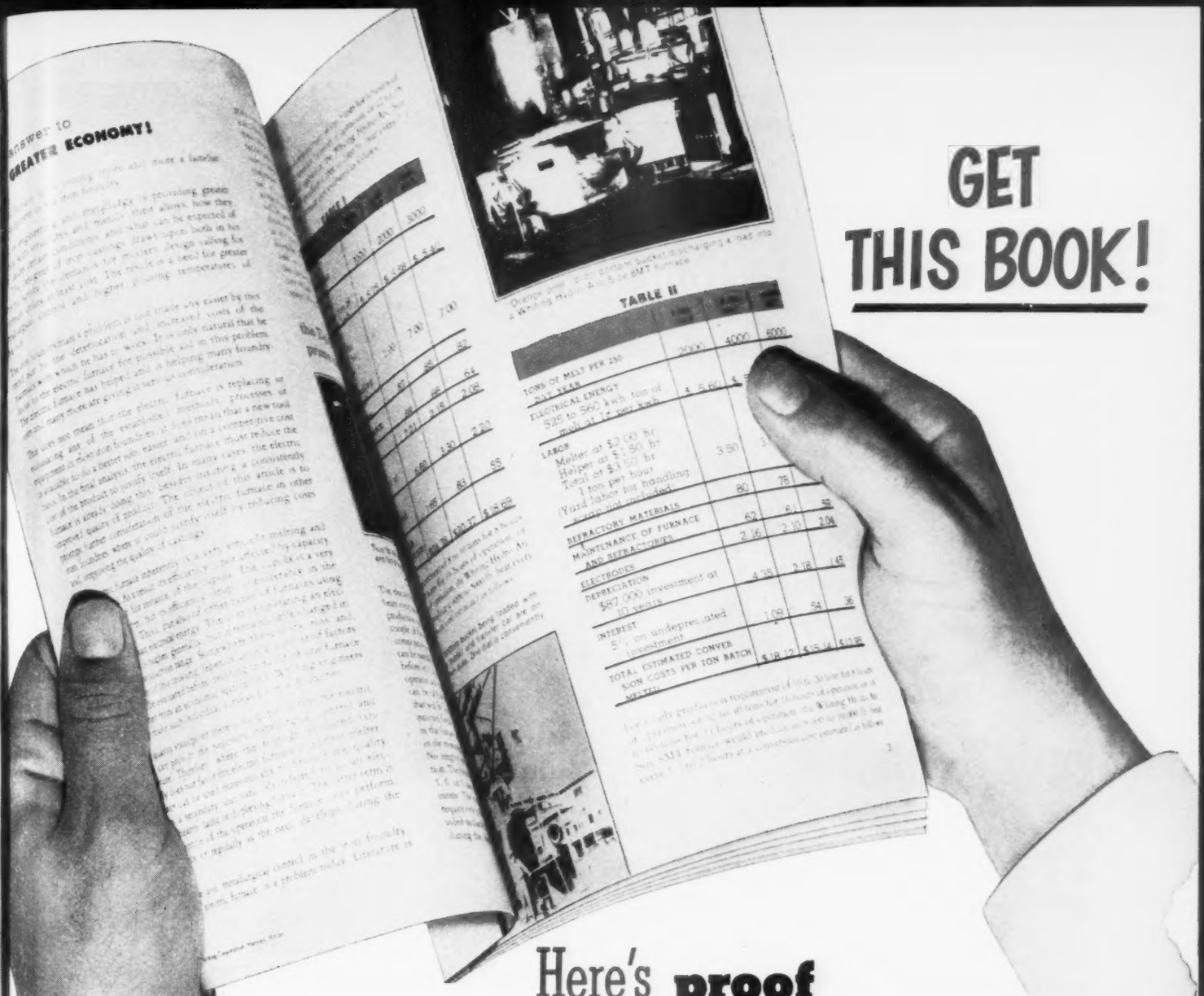
	Production** (Standard grades—1000 net tons) Total	Foundry	Malleable	Basic	Low Phos. Intermediate Low Phos. & Bessemer	Consumption* (By type of furnace, 1000 gross tons) Total	Cupola	Air	Electric
1950	64,589.1	2,870.4	3,034.2	50,450.5	8,234.0	58,416	5,475	319	326
1951									
Aug.	5,988.6	252.7	254.4	4,723.3	758.2	5,358	465	30	11
8 mo.	46,617.8	2,135.1	2,037.2	36,595.3	5,850.2	42,324	3,962	239	90
Sept.	5,811.6	257.7	243.7	4,576.8	733.4	5,266	431	27	12
Oct.	6,112.6	260.6	299.4	4,777.4	775.2	5,601	489	31	14
Nov.	5,824.5	285.5	269.0	4,532.1	737.9	5,287	448	29	9
Dec.	5,898.1	247.4	257.5	4,653.0	740.2	5,282	401	28	11
Total	70,264.5	3,186.2	3,169.0	55,134.1	8,774.8	63,760	5,731	354	136
1952									
Jan.	5,964.3	233.1	285.8	4,672.3	773.1	5,452	466	29	14
Feb.	5,701.8	245.2	261.4	4,496.9	698.3	5,139	441	29	11
Mar.	6,226.2	250.3	273.1	4,895.9	806.9	5,552	433	27	7
Apr.	5,170.0	243.8	218.5	4,069.9	638.0	4,714	446	28	8
May	5,414.2	245.4	236.0	4,295.6	637.2	4,823	412	25	8
June	1,043.2	133.7	103.1	758.6	47.7	....	....	....	....
July	981.6	119.7	118.3	712.9	30.7	....	....	....	....
Aug.	5,767.3	262.9	280.6	4,553.8	669.9	....	....	....	....
8 mo.	36,268.6	1,734.1	1,776.8	28,455.9	4,301.8	....	....	....	....

Iron and Steel Scrap Consumption

(Gross tons*)

	All Scrap—Total	All Scrap—Purchased	By Types of Furnace: Cupola—Total	Cupola—Purchased	Air—Total	Air—Purchased	Electric—Total	Electric—Purchased
1950	61,497,000	29,403,000	9,474,000	4,666,000	1,118,000	407,000	6,385,000	3,828,000
1951								
May	6,096,678	3,087,313	1,063,281	568,198	111,914	39,312	734,483	484,878
5 mo.	29,585,089	14,903,454	5,106,735	2,699,028	535,122	195,796	3,479,477	2,240,217
June	5,693,402	2,847,856	972,949	517,604	108,740	39,454	693,636	462,092
July	5,298,644	2,581,856	747,864	393,254	80,903	29,858	632,782	421,689
Aug.	5,614,535	2,721,287	918,180	487,085	104,809	37,592	720,020	475,190
Sept.	5,377,491	2,585,665	811,332	427,035	93,166	33,640	688,941	460,448
Oct.	5,869,590	2,826,221	951,406	504,804	102,950	38,534	750,915	489,217
Nov.	5,596,368	2,699,556	847,991	451,591	90,302	33,795	738,589	489,999
Dec.	5,483,089	2,656,536	738,150	398,538	87,748	32,430	687,559	450,158
Total	68,518,208	33,822,431	11,090,607	5,878,939	1,203,740	441,099	8,391,919	5,389,005
1952								
Jan.	5,847,011	2,788,426	846,891	449,935	101,211	38,150	743,233	470,126
Feb.	5,572,506	2,702,092	789,293	419,279	94,900	35,536	697,319	440,325
Mar.	5,902,529	2,860,364	791,165	415,853	92,751	35,013	741,793	475,161
Apr.	5,360,417	2,657,926	834,066	440,035	106,059	38,888	684,318	427,339
May	5,369,258	2,660,471	779,436	404,899	94,597	35,966	700,617	455,460
5 mo.	28,051,721	13,669,279	4,040,851	2,130,001	489,518	183,553	3,567,280	2,268,411

* Source: U. S. Dept. of Interior, Bureau of Mines. ** Source: American Iron & Steel Institute. [1] Source: Bureau of the Census. [2] For sale only.



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FO-3, "Hot-Blast"
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NATIONAL FOUNDRY ASSOCIATION MEETS

To Discuss Various Industry Problems

By FRANK G. STEINEBACH
Editor
FOUNDRY

PROBABLE business trends, safety programs for the foundry, and several phases of labor relations, were program features at the 44th annual meeting of the National Foundry Association held at the Edgewater Beach Hotel, Chicago, Sept. 18-19. Attendance approached previous records of the organization.

W. Summerfield Brunk, Headford Bros. & Hitchins Foundry Co., Waterloo, Iowa, was elected president, succeeding A. V. Martens, Pekin Foundry & Mfg. Co., Pekin, Ill. W. W. C. Ball, Taylor & Fenn Co., Hartford, Conn., was elected vice president, and the late E. B. Sherwin, Chicago Hardware Foundry Co., North Chicago, Ill., who died Oct. 10, was re-elected treasurer. Edward J. Walsh will continue as executive secretary.

The administrative council for 1953 comprises: Paul L. Arnold, United States Pipe & Foundry Co., Chattanooga, Tenn.; W. W. C. Ball, Taylor & Fenn Co., Hartford, Conn.; Roger A. Black, Ohio Brass Co., Mansfield, O.; James Eastwood, Benjamin Eastwood Co., Paterson, N. J.; James S. Ervin, Mackintosh-Hemphill Co., Pittsburgh; Henry S. Faust, Hansell-Elcock Co., Chicago; H. M. Greenbaum, Acme Foundry Corp., Cleveland; Arthur G. Hall, Nordberg Mfg. Co., Milwaukee; G. A. Kastner, Lincoln Brass Works Inc., Detroit; H. E. Ladwig, Allis-Chalmers Mfg. Co., Milwaukee; Robert Langsenkamp, Langsenkamp-Wheeler Brass Works Inc., Indianapolis; John F. Livingston, Crouse-Hinds Co., Syracuse, N. Y.; H. A. McLellan, Grinnell Corp., Atlanta; M. G. Moore Jr., Empire Steel Castings Inc., Reading, Pa.; Herman Menck, Harnischfeger Corp., Milwaukee; R. C. S. Potter, Chemung Foundry Corp., Elmira, N. Y.; R. D. Zangrilli, Standard Electric Steel Castings Co., Springfield, Mo.; A. C. Ziebell, Universal Foundry Co., Oshkosh, Wis.

President Martens, in his annual address, paid tribute to the 16 hardy foundrymen who met at the Imperial Hotel, New York, Jan. 26, 1898 and formed the NFA. He pointed out that under the leadership of W. H. Prahler, its first president, and John A. Penton, publisher of FOUNDRY and its first secretary, the organization emerged as a symbol of free enterprise. NFA played an important part in solving some of the serious labor problems of that period, and has continued to serve in that field.

Today, in President Martens' opinion, the industry is confronted with problems having much in common with those that prompted the establishment of the association. However, the situation today has one important difference. Now, big government and big labor are pledged allies. Although both depend on the fruits of the industrial life of our economy, both are seeking to invade the right to manage—to avoid the risk—to demand assumed rights and to deny duties. Mr. Martens pointed out there is little wonder that the two major areas of activity of NFA are labor relations and legislation. The speaker then outlined some of the important services of the association.

Speaking on "How To Set up a Foundry Safety Program," William N. Davis, director, Safety, Hygiene and Air Pollution Program, American Foundrymen's Society, indicated that foundries have a long way to go before they can compare their frequency rate with that of other industries. While the frequency rate for all industry was 13.5 in the first quarter (13.5 lost-time accidents per million man-hours worked) the frequency rate for the foundry industry was 26.9.

Mr. Davis pointed to the encroachment of regulatory bodies upon the prerogatives and responsibilities of foundry management, based on the theory that the only way to improve working conditions is through legislation. The speaker declared this philosophy is wrong, because 85 per cent of all accidents are caused by the human element, and are not the fault of unsafe machines or unsafe conditions in the plant. However, so long as the industry continues to have high frequency rates, attempts will be made by regulatory bodies to pass laws governing industrial safety, and the number of factory inspectors needed to enforce these laws will increase.

Humanitarian considerations provide the most important reason for accident prevention through a safety program. Foundry managers do not want employees injured or killed, according to Mr. Davis. High cost of accidents is another consideration. Studies have shown that there are many hidden costs in addition to insurance premiums. These include damage to the worker's machine, equipment or material; lost production on the injured worker's machine and by other workers; and the cost of training a new employee, caring

NFA officers include, left to right: Vice President W. W. C. Ball, Treasurer E. B. Sherwin, President W. Summerfield Brunk, Retiring President A. V. Martens, and Executive Secretary Edward J. Walsh

for the injured employee, investigating the accident, and the general upsetting condition in the plant.

A study of the overall accident problem and records is the first step in setting up a safety program, according to Mr. Davis. Unless management is entirely sold on the program and is willing to back it fully, the effort will not succeed. The next step is to have a safety organization whose prime function is to enlist and maintain the interest of every person in the plant in the task of preventing accidents. Mr. Davis concluded with definite instructions on the establishment of a safety program.

Two economists, speaking on the program, indicated there may be some cause for concern over business profits. George W. Mitchell, vice president and chief economist, Federal Reserve Bank of Chicago, discussing "Economic Conditions and Business Prospects," indicated that we are enjoying a high level of economic activity, higher than it was thought possible to attain seven years after the war. The tempo at present is not feverish, but at a high level. This is shown in the employment of 64 million; a high level of industrial production as reflected in the index of industrial production of the Federal Reserve Board; an improvement in retail trade; and improved profits in the fourth quarter which may bring the year to the 1951 total, in spite of the crippling steel strike.

Some elements that are causing worry, according to Mr. Mitchell, include the trend of cost-price relationships; need for continually breaking records to keep up with the rapid increase in the population; and expansion of productive capacity and the fact that a portion of this increase is not being used. He indicated that the only serious threat of inflation seems to be in the industrial situation, but the prospects for deflation appear much more disturbing. The problem is to keep going at a good clip through maintaining or increasing the demand for goods and plant. In addition to government spending on defense, which will continue to stretch out, Mr. Mitchell suggested watching government spending in the state and local level as a means of taking up slack when defense production tapers off. Shifts in population and the dispersal program have developed the necessity of constructing a large amount of new housing and required facilities. Also, attention must be given to an expanded highway construction program. After the tremendous expansion in plant facilities during the past seven years, some observers see a decline in this area.

Questions Economic Outlook

Phil S. Hanna, financial and business editor, the *Chicago Daily News*, was in his usual good form in a talk on the economic outlook, entitled "The Country Is Not Going to Hell, Just Through It." He stated that in his opinion the stock market is saying that business is not going to be as good as last year. He pointed to the fact that some important companies are doing more business to make less money. From the overall standpoint, he believes that we are doing pretty well, but questions if we can keep it up. Commenting on the coming elections, Mr. Hanna indicated that until business men take as much interest in government as in the manufacture and selling of goods, conditions in government are not going to improve.

Speaking on "Government Participation in the Field of Labor Relations," James J. Reynolds Jr., vice president, United States Pipe & Foundry Co., and a member of the National Labor Relations Board from 1946 to 1951, gave an interesting review of widespread activities of the government in the field of labor. Mr. Reynolds discussed in some detail the provisions of the Taft-Hartley law, and related his experience as a member of the Labor Relations Board. He indicated that government participation in the field of labor relations should be at a minimum. Stressing the importance of greater productivity, he stated that the Department of Labor is hardly the place to make studies for the development of the productivity factor.

The Friday morning session was devoted to an interesting panel discussion on "Labor-Management Problems," with special emphasis on union security. Clarence M. Updegraff, University of Iowa, Iowa City, Iowa, was moderator. Management representatives were H. W. Story, vice president and general attorney, Allis-Chalmers Mfg. Co. and C. Wayne Brownell, vice president and director of industrial relations, Packard Motor Car Co. Labor representatives were Clinton S. Golden, lecturer, labor relations, Harvard University, and formerly vice president, United Steel Workers of America (CIO) and Edward J. Fillenwarth, labor attorney. In the opinion of the audience, this program feature was especially

(*Concluded on page* 156)

Meeting of NFA Administrative Council shows, clockwise: R. D. Zangrilli, F. W. Johnson, A. V. Martens, R. R. Washburn, A. L. Dyer, F. W. Busche, H. S. Faust, E. B. Sherwin, A. G. Hall, W. W. C. Ball, C. T. Sheehan, Edward J. Walsh, W. Summerfield Brunk, H. H. Harris, G. A. Kastner, H. M. Greenbaum, John F. Livingston, Paul S. Arnold, Herman Menck, R. C. S. Potter, H. E. Ladwig, D. C. Hurm, Roger A. Black

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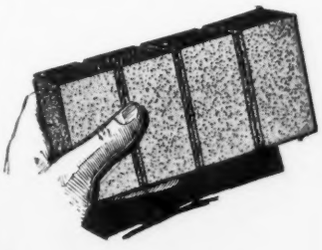

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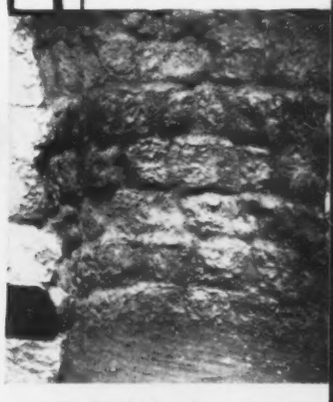

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(*Concluded from page* 154)

interesting.

I. R. Wagner, Electric Steel Castings Co., Indianapolis, a past president of the association and chairman of the resolutions committee, presented five resolutions covering the association's views on five subjects. These included taxes, labor relations, annual wages, responsibility of unions and its members, and violations of provisions of the Taft-Hartley Act.

The Hon. Everett M. Dirksen, senator from Illinois, gave an inspiring talk on the problems of government at the Thursday luncheon. In opening his discussion, the senator paid tribute to the importance of the foundry industry by stating it would not take long to devastate America if there were no castings. This, he stated, is a tribute to a free enterprise system.

Some years ago, the senator stated, some wise men got together and produced a constitution which provided the framework for a system. But over the years, something has happened to this document and the system is suffering. As an example, he stated the constitution provides that only Congress can appropriate funds. But under present procedures, the men who do the estimating of needs also do the spending, so that they always make the estimate high enough and then see that all of the funds are spent. Action of the Congress has become only a ratification ceremony. By establishing a staff to study and report on the estimates of the various government agencies, it is probable that $1 billion could be saved for every $1 million spent on such staff work.

Senator Dirksen questioned if legislative powers are passing through the development of administrative law, where powers are granted to the administrative branch of the government to make regulations which have the power of law. He stated emphatically that setting prices is a function of the foundry industry and not for an agency in Washington. In conclusion, the senator criticized the ease with which we accommodate ourselves to these things which encroach on our liberties, and questioned our will to resist the present trends.

Design Is Basic

At luncheon on Friday, Clarence Manion, recently dean of the University of Notre Dame Law School and author of the book "The Key to Peace," stated that our government is the one thing that has not followed the original design. Foundrymen know the importance of design in castings and how closely the finished castings follow the design. The design for our government is the Declaration of Independence, where the Creator is acknowledged, the rights of free men expounded, freedom is outlined, and the role of government is closely limited. If man is free, government must be in chains. Without God, men can only turn to the state.

Dean Manion emphasized we have drifted away from limited government, as called for in the original design, into big bureaucratic government where men, not laws, govern. He believes that we must return to the original design—throw off the cow concept of government, if we are to remain free. Through voluntary control and restraint, we can do away with any possible need for government controls and restraints.

Group at the NFA annual meeting. Left to right are: W. Summerfield Brunk, president elect; I. Richards Wagner, past president; Everett M. Dirksen, U. S. senator from Illinois; Herman Menck, past president; A. V. Martens, retiring president, and Frank G. Steinebach, *Foundry*

Hold Forums to Increase Industrial Productivity

In co-operation with local power companies, General Electric Co. is sponsoring a series of industrial productivity forums throughout the nation. Based upon the proposition that America needs to increase its production of goods by $20 billion per year even though no appreciable increase in the labor force is possible, these forums point out means of using machines and electrical power more efficiently in order to do the job.

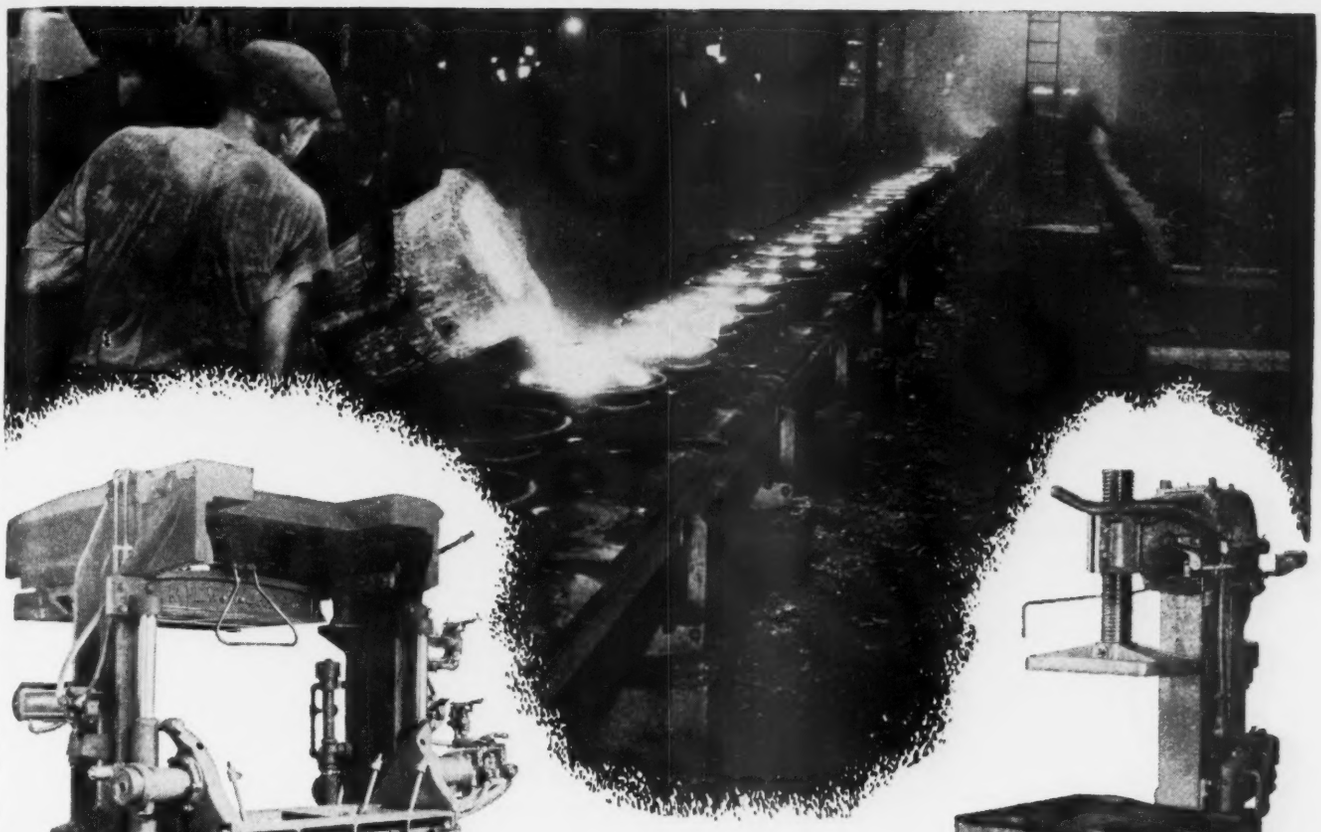
It is pointed out that worker productivity in this country has doubled since 1940 and that there is no reason why it cannot do so again. The American worker is said to be ten times as productive as others already, and the forum speakers detail means whereby that margin of superiority can be further increased.

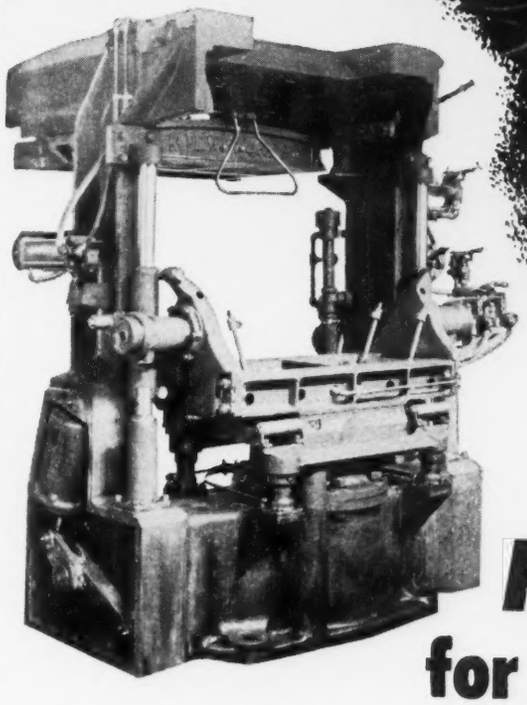
In the course of the presentation, which includes movies and exhibits, more efficient power distribution in industrial plants is discussed as one step toward economical, expanded production. Experts on the subject suggest such measures as the use of higher voltages from the utility, stepped down by small substations at strategic areas within the plant, not from one central point, but to 480 v more often than to the 220 widely used now.

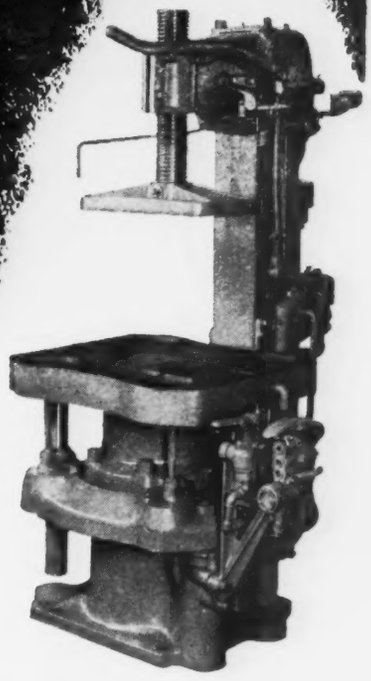
Greater use of adjustable speed drives, application of new and versatile electric heating devices, increased mechanization of materials handling, better lighting, use of electronic controls and improved maintenance of equipment are among other machines and procedures suggested in order to increase productivity in spite of the anticipated static labor supply during the years immediately ahead.

Article Treats Attributes Of Malleable Iron

Bulletin No. 44 of "Malleable Iron Facts," a series published by the Malleable Founders' Society, 1800 Union Commerce Bldg., Cleveland 14, makes available "Important Attributes of Malleable Iron," by James H. Lansing, technical and research director of the society. This paper, presented at the International Foundry Congress in Brussels, Belgium, in September, 1951, gives useful information on machinability, structure, fatigue endurance, notch fatigue endurance, impact resistance and other important attributes of malleable iron.







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AROUND THE COUNTRY

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FOUNDRY business conditions are varied. Activity of nonferrous foundries is weakening, most aluminum, brass and bronze foundries operating at about 60 per cent capacity compared with 75 or 80 per cent two or three months ago. Conversely, iron and steel foundries generally are pouring about 10 per cent more castings than last month. Average operating rate of iron foundries is 80 per cent, compared with 77 per cent in the first quarter and 87 per cent peak in third quarter in last year. However, backlogs are down to 60 days compared with 60 to 90 days two to three months ago.

Foundrymen do not regard as likely an upturn in business in the near future. Regarded as a fairly good barometer of foundry business prospects, activity of pattern shops is tapering. Patternmakers report fewer jobs are out for bid, and patterns once bid on are often not let.

Generally, foundrymen point out that current activity is what might be expected in December, but that the seasonal slump is coming four to six weeks early. Industry observers think the cause for the situation is traceable to the first quarter when many consumers in a flush of enthusiasm, overbought castings. Currently enough of these manufacturers have ceased buying to take the steam out of the casting market. A contributing cause for weakness in activity is the cancellation of important contracts for armed vehicles of Food Machinery Corp., San Jose. Elimination of this major program on the West coast is a blow to local foundries.

Foundries no longer include materials among their problems. All raw materials are abundant except nickel and molybdenum. No. 1 cupola cast is easily available at $43 to $45 per net ton delivered, and all the pig iron needed can be had at $56 per gross ton delivered.

In addition to needing more business, foundrymen hope for relief from the squeeze between the rising floor of higher labor and material costs, and the ceiling of OPS prices for castings. Profits before taxes of gray iron foundries from 1946-1951 averaged around 9 per cent. No current figures are available for this area but observers agree that foundry profits are tending sharply downward.

GRAY iron foundry operations have shown some improvement this fall, but not as much as anticipated. In fact, jobbing shops are disappointed, some no longer being able to maintain the 5-day a week schedule they experienced for a brief period in September. Shops most active are those engaged in producing soil and pressure pipe and sanitary ware.

Steel foundries are still operating at a full schedule of five days a week and in some cases five and a half days. Defense work is engaging a considerable amount of their output, this being in sharp contrast to gray iron shops, which report a relatively negligible amount. Malleable foundries are operating at a rate not as good as the steel foundries, but better than the average for the gray iron shops. In general, malleable shops are experiencing an improvement in both automotive and railroad equipment requirements; and further, are still benefiting to some extent by the overflow of business at steel foundries.

Navy and merchant marine work is contributing to some improvement at the larger brass and bronze shops. Smaller brass shops are participating in little of this business and in general are not very active. The few aluminum and magnesium foundries in this territory are actively engaged in aircraft work primarily, and are experiencing some gain in miscellaneous civilian requirements.

Raw materials are in adequate supply, although the coke market is buoyant due to higher prices on coal resulting from concessions recently granted miners.

In the New York district gray iron operations have been recently disrupted by an AFL strike at eight gray iron foundries in the Newark area over a question of wages. Output otherwise has shown improvement over the summer months, although still unsatisfactory. Steel foundry operations, however, are brisk and nonferrous shops are not complaining too much over the somewhat gradual gain in their business.

NO OTHER industry has done so much to reactivate foundries in the last few months as the automotive. Production shops in this area are working five or more days a week, many captive shops working the sixth, and nine-hour days are commonplace. Foundries in the Muskegon, Saginaw, Bay City and Detroit areas are seeking additional men.

Output of cars and trucks is little short of phenomenal in view of the materials restrictions and supply. Cutback of first quarter steel allocations to about 60 per cent of third quarter may alter the schedules of the car makers because it now appears that the industry will go into first quarter without a carryover of unused CMP tickets, but this is a bridge which the carmakers are not worrying unduly about until they come to it. The prevailing attitude is that a calculated risk must be taken—that risk is to build cars now to the utmost limit of materials and trust that more materials will be re

(*Concluded on page* 160)

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Agents: J. B. Hayes Company, Birmingham, Ala., George O'Hara, Long Beach, Cal., Great Northern Carbon & Chemical Co. Ltd., Montreal, Canada.

(*Concluded from page* 158)
leased when allocations are exhausted. If there are no additional CMP tickets forthcoming, the last month or six weeks of first quarter will be severely depressed for the auto industry.

New model changeovers are being accomplished with only minor losses in total production. This is surprising in view of the major changes being instituted by several automakers. Two of the overhead valve V-8 power plants which were earlier regarded as certain for 1953—Ford's and Mercury's—will not make their appearance on schedule. However, both will have increased power.

Chevrolet and Fontiac have been rumored as candidates for V-8 engines in 1953 models, but neither will make the grade. Chevrolet's present sixes will be increased in horsepower, the report being that the conventional transmission equipped car will put out 105 hp (against 92 currently) and the Powerglide-equipped engine will deliver about 115 hp, up 10 hp. Buick, bringing out an overhead valve V-8 of about 188 hp, is believed to have solved its production problems so well on this new engine that, instead of installing it in only the Roadmaster series, it may also be able to offer it optionally in the Super.

Lincoln, souping up its overhead valve engine, which was new in 1952 models through improved carburetion, will boast a 205-hp power plant in 1953. Another car which seems likely of exceeding the 200-hp figure is Cadillac, it and Oldsmobile reportedly increasing their compression ratio materially.

The same design principles which previously appeared in the Chrysler and DeSoto V-8 engines are starred in Dodge's Red Ram V-8. Developing 140 hp, this engine is claimed to produce more horsepower per cubic inch of displacement than any other now in production. Its displacement is 241.1 cu in. Compression ratio is 7.1 to 1. The engine has a short stroke and large bore, giving a rigid and compact structure and low friction.

Showing up in all the improved and new engines is the importance of smooth interior finish of intake and exhaust manifolds, as "breathing" of the engine has been found to offer a way of increasing horsepower without other major changes. Greater care in foundry practice has been an important contributor to these increases.

Die shops and die materials suppliers are looking with some anxiety on the sudden acceptance of plastic and fiberglass dies for short and medium run stampings in the auto industry. Die costs have become an increasingly troublesome burden for some low-volume producers, with the result that a 50 per cent or greater savings in die costs which some have achieved through use of plastic dies becomes very attractive. For the near term no one in the automotive or die industry contends that plastics will take over from iron dies in volume runs. Evidence that the automakers themselves are not forsaking iron by going overboard on plastics is the report that one of the largest body builders is on the verge of releasing a $73 million die program with foundries in this area.

Effect of Oxidation Rates

(*Concluded from page* 109)
five-minute intervals for 30-minute periods.

The first two samples poured, Figs. 8 and 9, serve to show two extremes encountered. Fig. 8, with 12,500 nodules, was poured at 11 a.m. and Fig. 9, with 256, at 2 p.m. when normal cupola operation was in force. Analysis of the former showed 2.84 per cent C, 1.43 per cent Si, which was an 8 per cent loss of silicon from the average of the charge. Fig. 9 showed 2.50 per cent C, 0.81 per cent Si, which is a 45 per cent loss. It must be borne in mind, however, that since only one-twelfth of the charge is sampled, the silicon analysis is not a true picture of the actual oxidation but only indicative because of the selective melting, as will be discussed later. While the nodule count varies with the silicon content the magnitude of the results obtained cannot be explained by the silicon content.

When the wide fluctuations in nodule number and appearance were encountered while the cupola was melting normally, it indicated the desirability of sampling at relatively short intervals for a period of time to reveal what happens as different materials making up the charge melt. Accordingly, test samples were poured every five minutes for a half hour on several days.

Figs. 1 to 7 are presented to show the general character of the results. In this case the cupola melting operation was proceeding in such a way that the average oxidation, as measured by the loss in silicon, was somewhat greater than the normal.

A log of the operation is shown in the accompanying table page 109.

At this time the cupola was melting one charge in about nine minutes, and the results on the cupola test samples indicate that at 1:30 steel was the predominant part of the charge being melted. At 1:35, pig iron was predominant; at 1:40, steel again; then mixtures in the next four and finally steel predominated again at 2:00 p.m., the third charge from 1:30 p.m.

It is obvious that with a coke bed and intermediate charges established as an average for a mixture of pig, sprue and steel, that the coke is not right for pig iron or steel, so that when pig iron is the predominant constituent the rate of oxidation is low and when steel is melting, the rate is high.

Normal malleable can be, and is, made with an all-steel charge. It is true that the silicon content must be raised, but the amount of silicon does not explain the nodule count and graphitization rate. For instance, as pointed out in the previous article, if the metal is melted with a high oxidation rate and the silicon raised to normal in the holding furnace by ferrosilicon additions, the nodule count and graphitization rate is subnormal. However, if an excess of ferrosilicon is added with a resultant higher than normal silicon content in the metal the nodules and graphitization are restored. Here again the results are not accounted for by the increased silicon content.

The conclusion is drawn that oxidation during melting is a potent factor with regard to graphitization rate, number and form of nodules and that it can be restored by subsequent deoxidation. The metallurgical mechanism operating to produce this condition is still obscure.

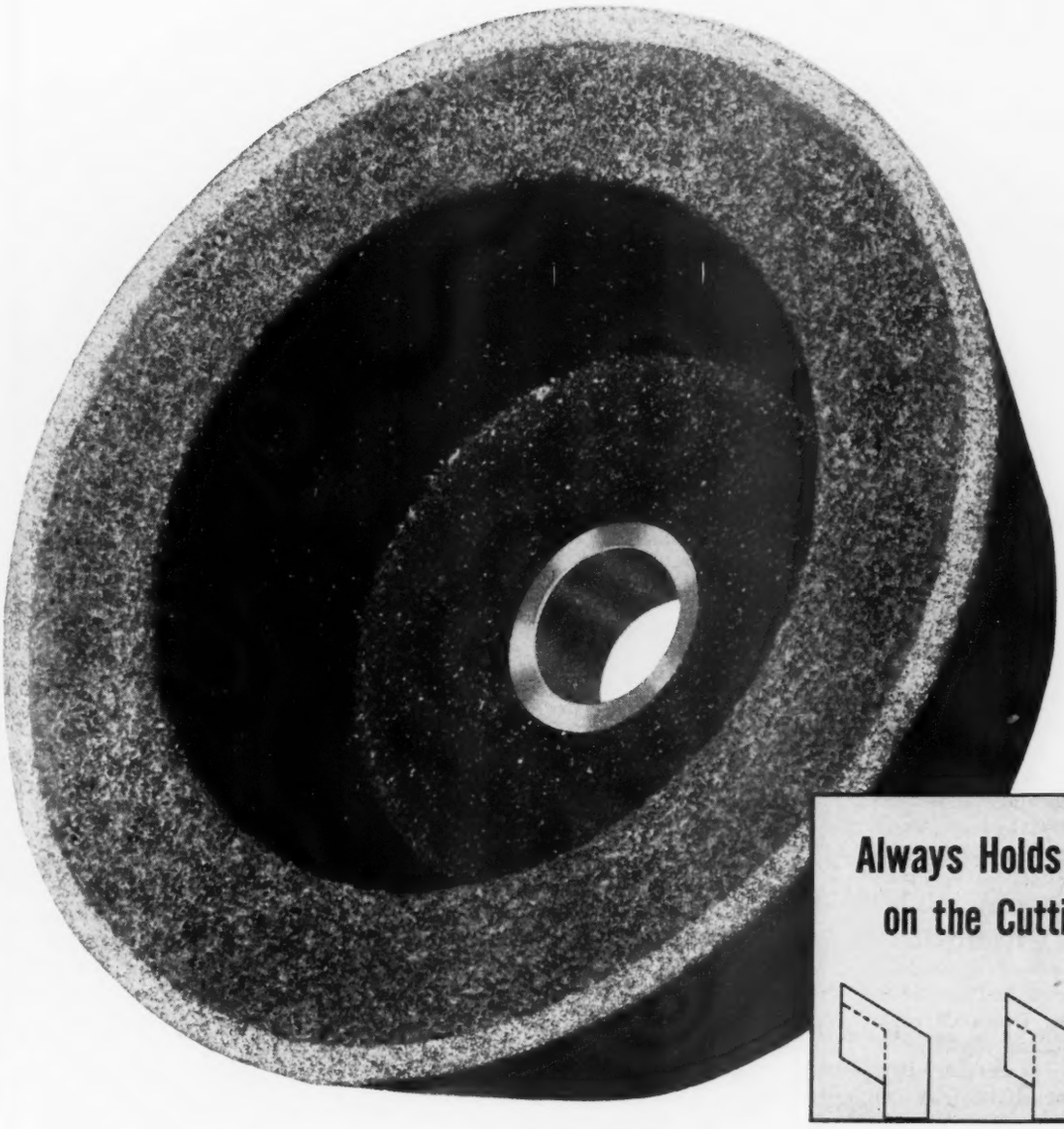
Stocks of Iron, Steel Scrap Increase

The steel strike during June resulted in an increase in consumers' stocks of ferrous scrap even though shipments were not being accepted by some mills, according to the Bureau of Mines, Washington. Purchased scrap stocks held by consumers totaled 4,440,057 gross tons, an increase for the sixth consecutive month and the largest quantity held by consumers since Aug. 31, 1944. Home scrap stocks amounted to 1,135,798 gross tons, an increase of 8420 tons over the previous month. Pig iron stocks totaled 1,490,133 gross tons, a decrease of 53,580 from May.

Foundry Changes Name

Foundry Division, General Machine Co., Emmaus, Pa., changed its name as of Oct. 8 to Emmaus Foundry & Machine Co., Emmaus, Pa. The change was made because the company felt that during its five years of operation it had outgrown the old name under which it started business

How U. S. Rubber improved cup wheels



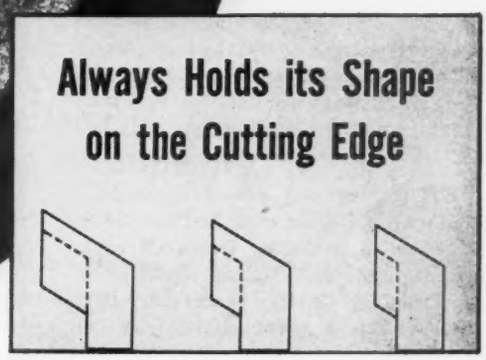


Diagram shows how the grinding face wears down evenly and the outer cutting edge remains sharp.

"U.S." technicians put an encircling rim, extra-tough and wear-resistant, around the free-cutting face of this Royalite® Hard-Shell Cup Wheel. As a result, the cutting edge does not become rounded. Hard-to-reach corners can be accurately ground because the edge does not break down. This free-cutting resinoid cup wheel retains its "true" shape throughout its entire service life.

Over 89 years' experience in the abrasive industry enables United States Rubber Company to solve all types of grinding problems. "U.S." engineers are always available for consultation. Write to address below.

PRODUCT OF U.S.RUBBER SERVING THROUGH SCIENCE

UNITED STATES RUBBER COMPANY

MECHANICAL GOODS DIVISION · ROCKEFELLER CENTER, NEW YORK 20, N. Y.

By EDWIN BREMER

Foundry DEVELOPMENTS

ADDITIONS of phosphor copper as a deoxidizer in producing bronze castings should be based on common sense, according to one producer of that material. He recommends that the additions be based only on the amount of ingot metal in the charge. It is pointed out that while 1 per cent of 15 per cent phosphor copper to 100 lb metal is not too much under normal conditions, the phosphorus content of the backstock always should be watched, and the latter should be proportioned to the ingot metal in each heat. Otherwise, methodical additions of phosphor copper may build up the phosphorus in the backstock to the point where hardness causes difficult machining, shrinkage difficulties are encountered, pouring temperatures are affected, and the fluid metal penetrates mold walls and cores.

* * *

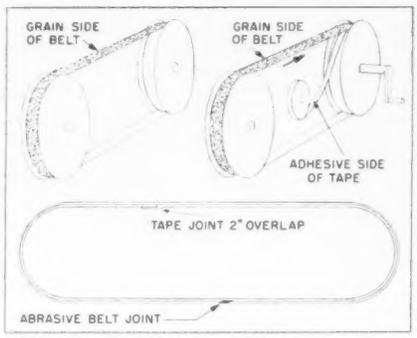
CERAMIC coatings developed and applied by a California firm to mild steel ladles holding molten aluminum alloys are claimed to increase the life two-fold since the coatings withstand severe heat and thermal shock. Firm is said to have under consideration similar coatings for kettles or tanks holding molten zinc, lead, etc.

* * *

STUDY of the effect of various elements on aluminum with relation to Young's modulus, Poisson's ratio and rigidity modulus, as reported by N. Dudzinski in the September, 1952 issue of the *Journal* of the Institute of Metals (Great Britain), led to the conclusion that, with the exception of calcium, strontium and magnesium, all the elements investigated improve Young's modulus. Improvement, except for silver, is proportional to concentration of the alloying element and is particularly marked with chromium. Improvement depends on structure of the intermetallic compound which the alloying element forms with aluminum; the greater the aluminum atoms the greater the effect. In ternary alloys a useful increase in modulus is obtained in aluminum-manganese-chromium alloys with a Mn:Cr ratio of 4:1. Specific modulus also is high.

* * *

ABRASIVE belts subjected to excessive loads may be strengthened quickly and inexpensively with a backing of pressure-sensitive, Fiberglas-reinforced strapping tape, according to an investigation by the Product Engineering Department, Behr-Manning Corp., Troy, N. Y. It is claimed that this simple modification often may permit use of such belts for fast removal of metal and in



fining operations considered too severe for commercial equipment of this type. Reinforcement is accomplished by lining the cloth side of the abrasive belt with a lamination of the pressure-sensitive tape. A simple arrangement of pulleys can be set up to expedite the job as shown in the accompanying illustration; using two pulleys over which the belt is stretched with a spindle between the two for holding the roll of tape. In addition to increasing the tensile strength of the backing, the belt joint is reinforced, and the crosswise rigidity of narrow belts is increased, holding bowing and twisting to the minimum.

* * *

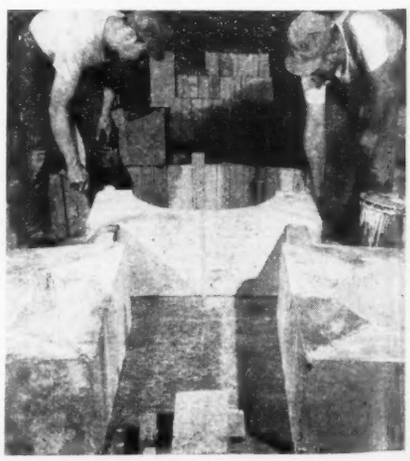
RADICALLY new construction material with many potential applications in the building trades has been developed by a ceramic expert at Armour Research Foundation, Illinois Institute of Technology. However, the thought occurs that it also may be useful in the foundry as a molding medium. Material consists of tiny glass balloons about the size of grains of sand, made by blowing up individual grains of clay in a special furnace. Procedure is to feed ground and screened clay into the top of a vertical furnace where it meets the approximately 2700°F heat of a gas-air flame. Gases given off by the tiny melted blobs at the correct instant inflate them into hollow spheres which fall to the bottom of the furnace. Size varies with raw material and method of processing. It is said that for building construction use the sizes from 0.0116 to 0.0069-in. diam which correspond to 50 to 80 mesh, seem to be the most useful.

* * *

JOINT Army-Navy research study pointing the way to achieve better training through motion pictures is described in a report from the Office of Technical Services, Department of Commerce, Washington 25. Report is the result of a five-year study by specialists of Pennsylvania State College who summarized, evaluated and integrated research done in the training field through films from 1918 to 1950. Report is intended as a guide for those who plan, prepare, and use films to help them predict the results of film instruction more accurately, improve the planning and increase the effectiveness of film utilization procedures. Consisting of 185 pages the report is PB 111000, *Instructional Film Research*, 1918-1950 and is priced at $2.50.

* * *

TIMKEN Roller Bearing Co., Canton, O., has saved time, money and health in a new system of building electric furnace silica brick roofs by use of pre-shaped silica brick. These are made by a refractory maker, and delivery takes about 6 months. Previously 320 man-hours were required to do what now is accomplished with 48 man-hours. Silica dust is eliminated since none of the shapes has to be cut. Life expectancy of the roofs is three to four weeks.



HOW AMERICA OUT-PRODUCES THE WORLD

Logan Roller Conveyors help cut costs on this high speed unit making cores for diesel engines. The core molds never leave conveyor and blower is kept operating at full capacity.

5

American Industry { *"Keeps expensive equipment operating at capacity"*

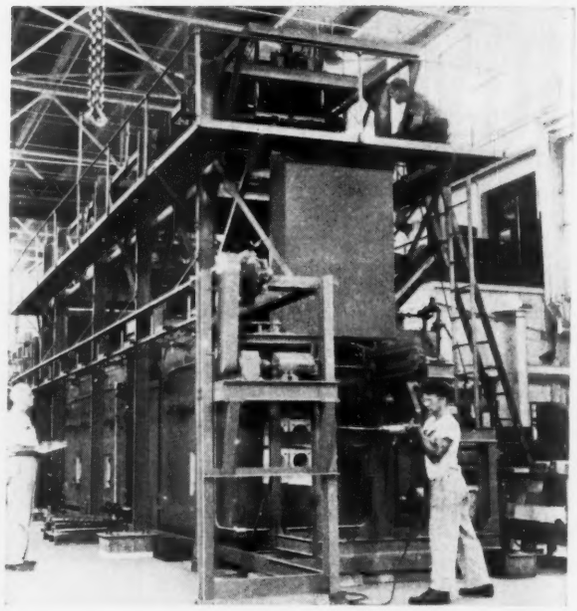
Another good American industrial habit — stepping-up the hourly output of machines! This means greater production, and lower-costs too. One of the chief factors in "keeping machines busy" is equipment like Logan Conveyors. By delivering core boxes to core blowers, flasks to molding machines, molds to shake-out, and castings to and from machine operators, Logan equipment aids in attaining the high American foundry output per machine-hour. And remember, the name "Logan" on the installation you buy is your assurance of something extra in engineering, design, and layout. Write today to —

Logan Conveyors

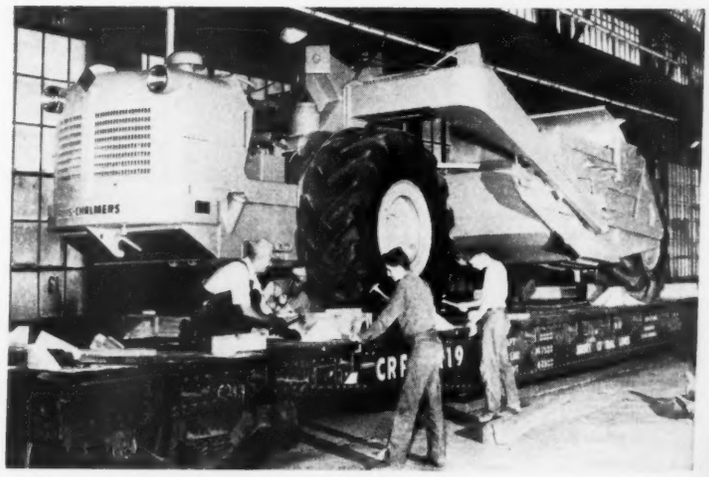
LOGAN CO., 580 CABEL ST., LOUISVILLE, KY.

NEWS VIEWS

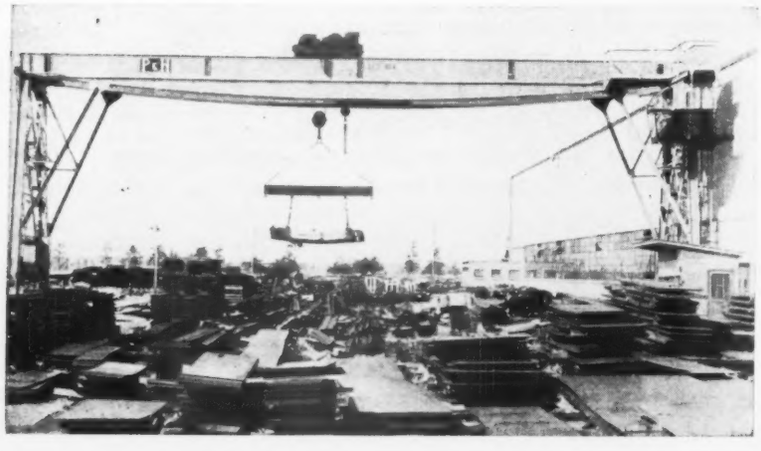
FOUNDRY APPRENTICES: This foundry apprenticeship exhibit was prepared by Nordberg Mfg. Co., Milwaukee, and displayed at the 1952 Wisconsin State Fair as part of the industrial apprenticeship exhibit sponsored by Wisconsin Manufacturers Association in cooperation with the Wisconsin Industrial Commission. It was intended to show what industry is doing to offer organized training opportunities to youth on an apprenticeship basis in order to develop skilled foundrymen. Nordberg was represented at the booth by Harry J. Esser, supervisor of apprenticeships.



GUN BARREL FURNACE: This automatic gun barrel hardening, quench and draw furnace, including automatic loading and unloading devices, is 42 ft long, 10 ft wide and 19 ft high. It is being assembled in the large main bay of Lindberg Engineering Co.'s Plant No. 1, Chicago.



NEW PRODUCT: Entrance of Allis-Chalmers Mfg. Co. into the motor scraper field was marked by shipment of this machine from the Cedar Rapids, Iowa, plant recently acquired by Allis-Chalmers from LaPlante-Choate Mfg. Co., Cedar Rapids.



SELF-POWERED CRANE: When a northern Michigan manufacturer wanted a gantry crane designed for yard service at his plant without either overhead or underground power lines, P&H Overhead Crane Division, Harnischfeger Corp., Milwaukee, built one which had its own power source. The gantry crane illustrated here has a 60-ft span, a 15-ton capacity and a 3-ton auxiliary. Power is provided by a built-in diesel engine generator. The 80-hp engine drives a 50-kw direct current generator for all crane operations. The operator has all engine controls in the enclosed, heated cab and can start, regulate and stop the diesel engine from that location.

Get the Advantages of a *Really* PORTABLE MULLOR

(With spring-loaded mulling wheels since 1944)

Real Portability—only the sand need be moved . . . not the entire mullor. The Mulbaro provides real ease and convenience.

Sand Is Handled Only Once—that's when it is placed in the barrow for mulling. Mulled sand is moved to the molder or coremaker in the same barrow.

Knee-High Barrows for Easy Loading—no need to raise the sand to a waist-high crib opening. Barrows may be loaded from any side or from overhead bin or hopper.

Use Two or More Barrows With One Mulbaro—when a batch is mulled, move the barrow out and move a second into mulling position. Then, mull the second batch while the first is moved to molding floor or core bench.

Short Time Cycles, Real Mulling Efficiency—only the Mulbaro offers modern mullor design in a portable machine. Light-weight, rubber-tired, spring-loaded mulling wheels; high-agitation plow design, and hemispherically shaped barrow bowl insure complete mulling of core or molding sand in short time cycles.

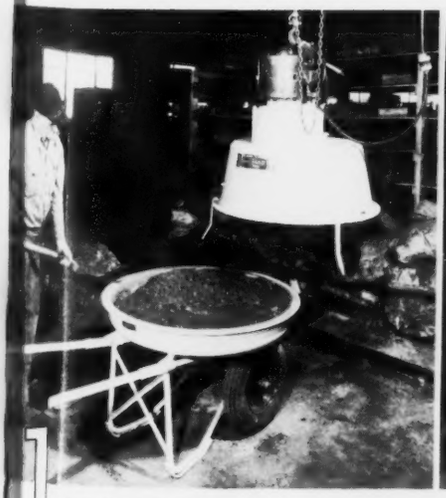
The MULBARO

Write today for complete information!

BEARDSLEY & PIPER
Div. Pettibone Mulliken Corp.
2424 N. Cicero Ave.
Chicago 39, Illinois

FOUNDRY EQUIPMENT MANUFACTURERS ASSOCIATION INC. MEMBER FEMA

LOOK TO
BEARDSLEY & PIPER
FOR BETTER METHODS



1 The Mulbaro couldn't be easier to operate. Just load the knee-high barrow from heap or overhead storage bin . . . the sand need be handled only once.

2 Lower the mulling mechanism, turn on the machine . . . and the mulling is completed in four minutes or less.

3 Move the barrow with the batch of mulled sand to any location in the foundry. No time wasted in loading and unloading!

GIW* DOUBLES OUTPUT

***GEORGIA IRON WORKS COMPANY**

. . . well-known Augusta, Georgia producer of heavy duty pumping, dredging and hydraulic mining equipment.

SPEEDMULLOR-PREPARATOR UNIT AND MOTIVE SANDSLINGER INCREASE MOLDING EFFICIENCY 600%

Before installation of their Speedmullor-Preparator Unit and Motive Sandslinger, GIW produced 15,000 lbs. of castings every two days with a molding crew of 30 men. Now, with 10 men, over 30,000 lbs. are produced—twice the output using only one-third the number of men. Foundry management at GIW attribute 90% of this gain directly to their "50" Speedmullor-"40" Preparator Unit and the Motive Sandslinger. In addition, castings now going into their products are truer-to-pattern and have a considerably smoother surface finish.

If you want cost-saving performance like this in your foundry, write today for complete information.

Beardsley & Piper, Div. Pettibone Mulliken Corp., 2424 N. Cicero Ave., Chicago 39, Illinois.

LOOK TO

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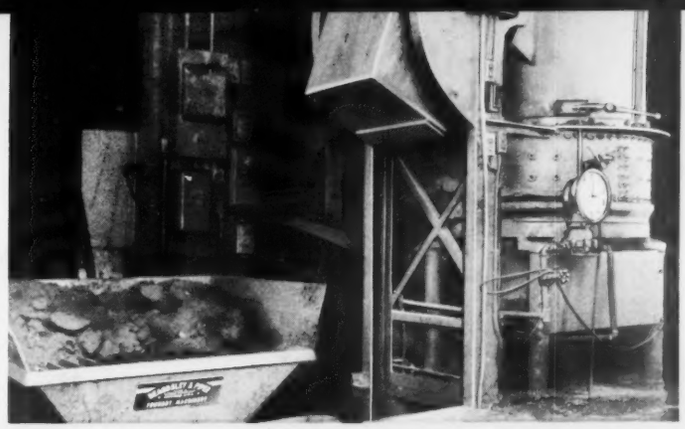
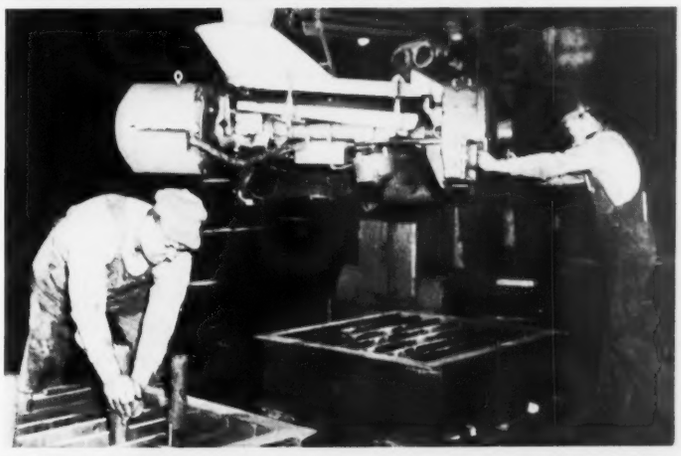
B&P



This small B&P Speedmullor-Preparator Unit completely conditions and fully mulls all of GIW's molding sand—60 to 70 tons a day.

UWITH ONE-THIRD THE MEN!

A tank of mulled and conditioned sand is placed on the Motive Sandslinger which rams all of GIW's molds. On a typical job, a 5000 lb. pump housing, molding time was cut from 65 to 12 man-hours.

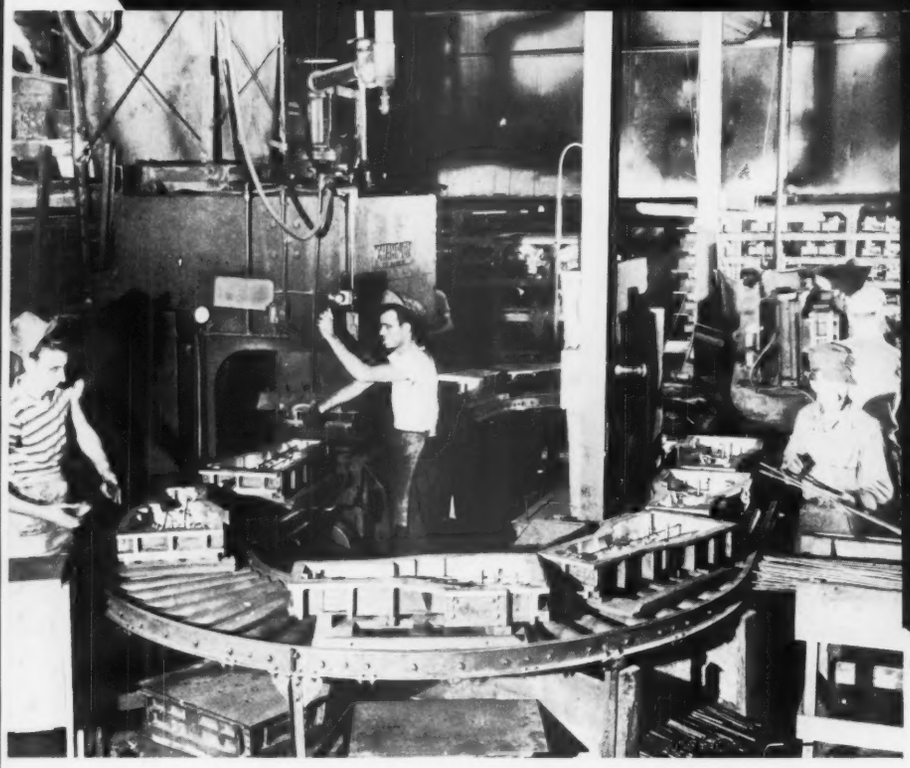


The slinger is used to ram a drag, as a cope is set up for ramming in the foreground. Molds are rammed on both sides of the slinger's long track.

A Model 3½ Mulbaro . . . all of the core sand required for this foundry is prepared in 350 lb. batches in the Mulbaro. Before the new Speedmullor-Preparator Unit took over molding sand preparation, this machine mulled all of the foundry's facing sand. It has been in operation over five years without downtime.

from the smallest...

A Champion CB-5 Core Blower in operation at General Malleable Corp., Waukesha, Wisconsin. The special stacking feet on the core dryers combined with the high production of the CB-5 permit maximum efficiency on this job . . . the blowing of port cores for diesel engine blocks.



to the LARGEST

At the Golden Foundry Company, Columbus, Indiana, up to 180 large half-barrel cores are blown each hour on this high production coremaking unit with a Champion CB-400 Core Blower. Core boxes are rolled over on the Johnston and Jennings 612 Rollover Draw machine in the loop at the right. For small cores or for the very largest, you just can't beat a Champion for production and efficiency.

there's a CHAMPION CORE BLOWER to meet every core room need!

From the small CB-5 to the huge CB-400, every Champion offers the same proven performance—the same unequalled production. Equipped with Champion's advanced design manual control, or available with Blo-Matic, the only fully automatic core blower cycle control, in the larger machines; each machine is adapted to a wide range of jobs. There's a size to meet *your* exact requirements!

THE CHAMPION:	BLOWS CORES UP TO:
CB- 5	4½ lbs.
CB- 10	11 lbs.
CB- 12	30 lbs.
CB- 15	55 lbs.
CB- 18	125 lbs.
CB-400	300 lbs.

BEARDSLEY & PIPER
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Manufacturers of the Sandslinger • Speedslinger • Hydra-Slinger • Speedmullor • Mulbaro • Screenarator • Nite-Gang • Junior Nite-Gang • Preparator • Magnarator • B&P Combination Units • Roto-Mold • Roto-Feed • Gyra-Screen • and the entire Champion line of: Core Blowers • Blo-Matic Core Blowers • Rol-A-Cor • Speed-Draw • Molding Machines • Electric Riddles

FOUNDRY EQUIPMENT MANUFACTURERS ASSOCIATION INC. MEMBER FEMA

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BEARDSLEY & PIPER
FOR BETTER METHODS

TABLE SETTINGS FOR PATTERN DRAFT

DRAFT ON ONE SIDE

	.03125	.0625	.09375	.125	.15625	.1875	.21875	.25	.28125	.3125	.34375	.375	.40625	.4375	.46875	.5
HEIGHT	1/32	1/16	3/32	1/8	5/32	3/16	7/32	1/4	9/32	5/16	11/32	3/8	13/32	7/16	15/32	1/2
12 Inches	9′	18′	27′	36′	45′	54′	1° 3′	1°11′	1°20′	1°30′	1°38′	1°47′	1°56′	2° 5′	2°14′	2°23′
11 Inches	10′	19′	30′	39′	49′	59′	1° 8′	1°18′	1°28′	1°38′	1°47′	1°57′	2° 7′	2°17′	2°26′	2°36′
10 Inches	11′	21′	32′	43′	54′	1° 4′	1°15′	1°26′	1°37′	1°47′	1°58′	2° 9′	2°20′	2°30′	2°41′	2°52′
9 Inches	12′	24′	36′	48′	1°	1°12′	1°24′	1°35′	1°47′	2° 0′	2°11′	2°23′	2°35′	2°47′	2°59′	3°11′
8 Inches	13′	27′	40′	54′	1° 7′	1°21′	1°34′	1°47′	2° 2′	2°14′	2°28′	2°41′	2°54′	3° 8′	3°21′	3°34′
7 Inches	15′	31′	46′	59′	1°17′	1°32′	1°47′	2° 3′	2°18′	2°33′	2°49′	3° 4′	3°19′	3°34′	3°50′	4° 4′
6 Inches	18′	37′	56′	1°12′	1°30′	1°47′	2° 5′	2°23′	2°41′	2°59′	3°16′	3°34′	3°53′	4°10′	4°28′	4°40′
5 Inches	22′	43′	1° 5′	1°26′	1°48′	2° 9′	2°30′	2°52′	3°17′	3°34′	3°56′	4°17′	4°39′	5° 0′	5°21′	5°43′
4 Inches	27′	54′	1°20′	1°48′	2°14′	2°41′	3° 9′	3°34′	4° 2′	4°28′	4°55′	5°22′	5°48′	6°14′	6°37′	7°11′
3 Inches	36′	1°13′	1°48′	2°23′	2°59′	3°34′	4°10′	4°39′	5°22′	5°57′	6°32′	7°11′	7°43′	8°18′	8°53′	9°27′
2 Inches	54′	1°48′	2°41′	3°34′	4°30′	5°21′	6°15′	7°11′	8° 0′	8°53′	9°45′	10°37′	11°29′	12°20′	13°11′	14° 3′
1 Inch	1°48′	3°34′	5°21′	7°11′	8°53′	10°37	12°20′	14° 3′	15°42′	17°21′	18°57′	20°34′	22° 7′	23°38′	25° 5′	26°34′

Example: ¼ draft is required on a piece 7″ high. Read up the left side to 7″ and on that line under ¼ on the top 2°3′. Set the table at 2°3′—estimate minutes.

Compiled by: Robert F. Speerbrecher, Circuit Foundry Instructor, Wisconsin Vocational Schools, Green Bay, Wis.

PROPOSED TENTATIVE RECOMMENDED

PRACTICE FOR CODIFICATION OF LIGHT METALS AND ALLOYS, CAST AND WROUGHT

ASTM Designation: B 000—52T

Issued, 1952

Scope

1. This recommended practice covers a system for designating light metals and alloys, cast and wrought. The Designations used in ASTM specifications under the jurisdiction of ASTM Committee B-7 on Light Metals and Alloys, Cast and Wrought, conform to this recommended practice.

Basis of Codification

2. (*a*) The designations for alloys and unalloyed metals are based on the chemical composition limits in ASTM specifications.

(*b*) The temper designation, which is used for all metal forms except ingot, follows the alloy designation and is separated therefrom by a dash.

Alloys

3. (*a*) Designations for alloys consist of not more than two letters representing the alloying elements (Note 1) specified in the greatest amount, arranged in order of decreasing percentages, or in alphabetical order if of equal percentages, followed by the respective percentages rounded off to whole numbers and a serial letter (Notes 2 and 3). The full name of the base metal precedes the designation, but it is omitted for brevity when the base metal being referred to is obvious.

NOTE 1.—For codification, an alloying element is defined as an element (other than the base metal) having a minimum content greater than zero either directly specified or computed in accordance with the percentages specified for other elements. The amount present is the mean of the range (or the minimum percentage if only that is specified) before rounding off.

NOTE 2.—The serial letter is arbitrarily assigned in alphabetical sequence starting with *A* (omitting *I* and *O*) and serves to differentiate otherwise identical designations. A serial letter is necessary to complete each designation.

NOTE 3.—The designation of a casting alloy in ingot form is derived from the composition specified for the corresponding alloy in the form of castings. Thus, a casting ingot designation may consist of an alloy designation having one or more serial letters, one for each product composition, or it may consist of one or more alloy designations.

(*b*) The letters used to represent alloying elements should be those listed in Table I.

Table I—Letters Representing Alloying Elements

A—Aluminum	G—Magnesium	Q—Silver
B—Bismuth	K—Zirconium	R—Chromium
C—Copper	L—Beryllium	S—Silicon
D—Cadmium	M—Manganese	T—Tin
E—Rare Earths	N—Nickel	Z—Zinc
F—Iron	P—Lead	

(*c*) In rounding-off percentages, the procedures described in the Recommended Practices for Designating Significant Places in Specified Limiting Values (ASTM Designation: E 29) should be used.

(*d*) When a range is specified for the alloying element, the rounded-off mean should be used in the designation.

(*e*) When only a minimum percentage is specified for the alloying element, the rounded-off minimum percentage should be used in the designation.

Unalloyed Metals

4. Designations for unalloyed metals consist of the specified minimum purity, all digits retained but dropping the decimal point, followed by a serial letter (Note 2). The full name of the base metal precedes the designation, but it is omitted for brevity when the base metal being referred to is obvious.

Highest Quality Steels

MADE WITH

VANCORAM FERRO VANADIUM

	Typical Composition
IRON FOUNDRY GRADE	Vanadium . 38-42% Silicon . . . . . 7-11% Carbon . about 1%
GRADE "A" *(Open Hearth)*	Vanadium . 50-55% Silicon max. 7.50% Carbon max. 3.00%
GRADE "B" *(Crucible)*	Vanadium . 50-55% Silicon max. 3.50% Carbon max. 0.50%
GRADE "C" *(Primos)*	Vanadium . 50-55% 70-80% Silicon max. 1.25% Carbon max. 0.20%

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MAKERS OF ALLOYS

VANCORAM

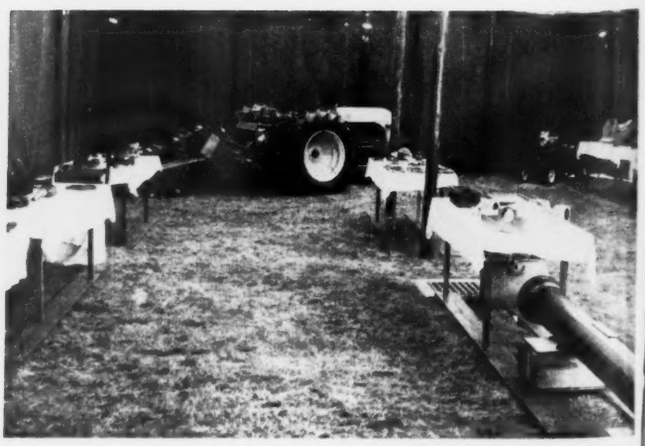
CHEMICALS AND METALS

Technical Editors See DUCTILE IRON POURED

A LARGE group of business paper editors witnessed the pouring of ductile iron at the Bayonne, N. J., research laboratory of the International Nickel Co., Sept. 25. The visiting technical writers also were shown a wide variety of applications for this engineering material and saw demonstrations of technical properties.

Castings and numerous machines in which ductile iron castings are used were displayed in a tent pitched on the laboratory grounds. Various types of testing machines in the laboratory were used to show properties, including tensile strength, impact strength, and bending properties. Following these demonstrations, the group was taken to the well equipped laboratory foundry where several heats of metal were tapped, treated with the magnesium alloy, and poured into molds. The cupola was operating on a basic lining.

Following the demonstration the group was taken to luncheon where members of the Nickel organization answered questions concerning the production and properties of ductile iron castings.



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So you've been using a certain brand of shot and grit for some time. We sincerely hope you don't have to! Because Super-Annealshot (malleableized) and Annealshot (regular) cost less than any other comparable abrasives. As for quality, Super-Annealshot and Annealshot are guaranteed to suit your requirements (see below left). So, why not at least investigate these better abrasives—why not send in a trial order?
FULLY GUARANTEED
If you don't find Super-Annealshot and Grit the best and most economical malleable abrasives you've ever used—return the un-used quantity for refund, at our expense.
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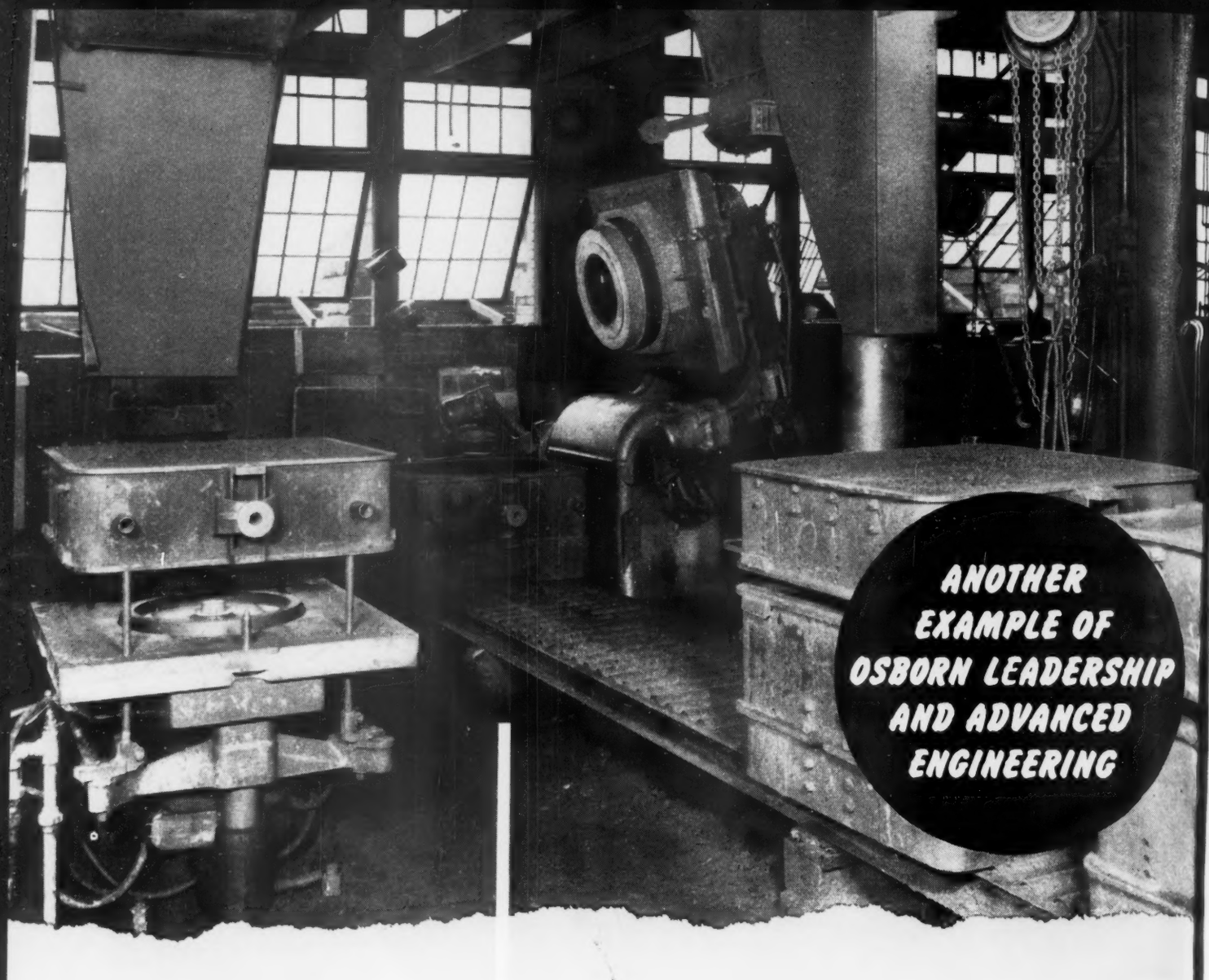

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OSBORN'S hard effective jolt and accurate draw assures quality mold production. Rugged construction, with above-the-floor adjustable lift pins gives flexibility in operation of each model as well as long dependable life and efficient production of quality molds over a wide range of flask sizes. Osborn's complete line of Jolt Strippers includes small, portable units to large, heavy duty machines for every type of foundry work.

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STEEL FOUNDERS' SOCIETY

Holds 50th Annual Fall Meeting

By FRANK G. STEINEBACH
Editor
FOUNDRY

REPORTS on the services of the Steel Founders' Society of America to the industry, consideration of future trends of society activities, and discussion of current defense problems, featured the 50th fall meeting of the Steel Founders' Society of America held at the Homestead, Hot Springs, Va., Sept. 22-23. Attendance was the largest in the society's history.

In opening the meeting, H. A. Forsberg, vice president, Continental Foundry & Machine Co., East Chicago, Ind., and president of SFSA, pointed with considerable pride to the important services which the society has established during the last ten years. These include the research program, which is providing exceptionally valuable information for the industry; the product development work, which recently has been re-activated; and the Technical and Operating Conferences, which permit the interchange of practical and technical information on the production of steel castings. One of the most important activities, in operation for a slightly longer period, pertains to industry personnel problems.

Push Product Development

Ross L. Gilmore, president, Superior & Malleable Castings Co., Benton Harbor, Mich., and chairman of the National Product Development Committee, outlined the work done in recent months in re-activating the product development program. Since March, the committee has selected a product development director for the society, formulated a product development program for one session of the annual T & O Conference to be held in Cleveland in November, and considered some of the current problems arising out of the demands of certain government agencies for castings for the defense effort.

The committee is endeavoring to establish a background of statistics on product development to permit evaluation of the progress that has been made, and point to logical future efforts. Mr. Gilmore announced that the committee would conduct a contest with suitable awards for the best product development activities in several categories.

The speaker indicated the goals of the Product Development Committee would remain the same as developed by the original committee. These include: 1. Regain any business which may have been lost to other forms of fabrication; 2. Prevent further inroads by competing types of engineering structures; 3. Generate new business for steel castings that will be of benefit to the entire industry. In furthering this program, the committee can do only a portion of the work. Mr. Gilmore emphasized that the co-operation of the entire industry is needed if the work is to be a complete success.

Foundrymen wishing to increase profits should be interested in product development, according to James H. Lowe, product development director of the society. During the past five months, Mr. Lowe has conducted a study of something under 100 steel foundries to find what is being done in the field of product development, and to determine results. He found that those who have taken the activity seriously and have organized to promote the idea have added a total of approximately $17 million in business during the past year.

The speaker pointed out that product development embraces a broad field. It includes, among other things, the application of mechanical design, metallurgical design, equipment and processing design, and cost control. The study shows that to date greatest interest in the activity has developed among specialty foundries where 60 per cent have product development departments. Miscellaneous jobbing foundries as yet have not embraced the program to the same extent, only 35 per cent being active. While 40 per cent of the conversions to steel castings comes from the weldment field, the greatest tonnage has developed from the forgings industry. The speaker concluded that the best way to be assured a profit, regardless of the business climate, is to be active in product development.

F. Kermit Donaldson, executive vice president of the society, reported that membership in the society now embraced from 90 to 95 per cent of the commercial production (castings for sale) of the steel castings industry. In addition, a sizable portion of the captive tonnage also is affiliated. Therefore, the society is definitely speaking for the commercial portion of the industry in its various activities with government agencies and others.

Mr. Donaldson stated the society recently has published a survey of steel foundries for 1951 which contains all vital statistics affecting the industry. Since 1946, according to Mr. Donaldson, all industry has recorded an annual increase in wages of 10 per cent. During the same period, the average increase in productivity would permit a wage increase of only 3 per cent. This in itself is inflationary, and the government action in controlling prices is an attempt to control the effect rather than the cause. Due to these misdirected efforts, the steel castings industry must have information to show where it stands. This is one of the most important activities of the society.

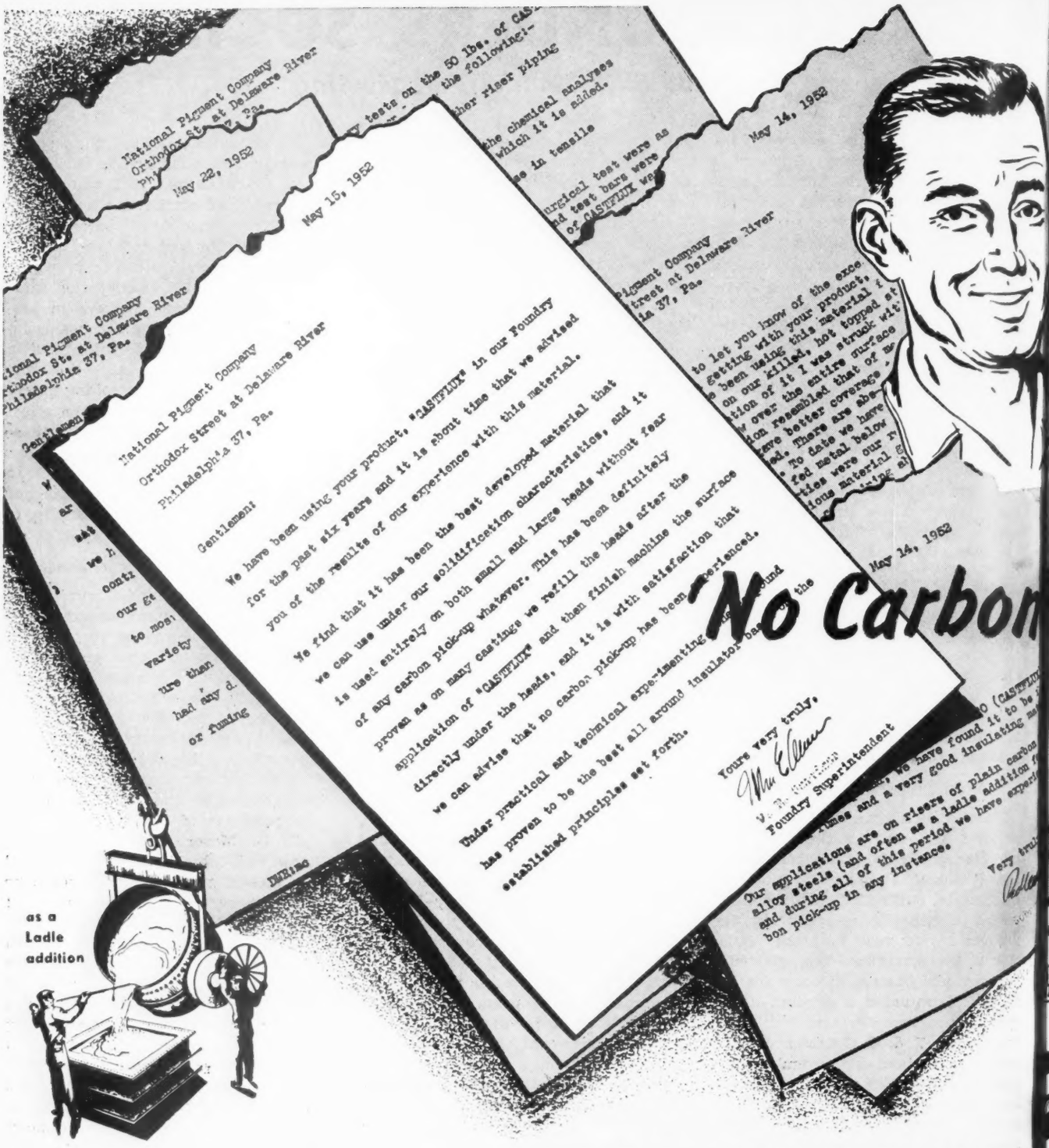
Government Lacks Understanding

Mr. Donaldson then discussed the work of the society in connection with the various government agencies. He stated that contact with government is dealing with people, many of whom have no knowledge or understanding of industry and its problems. The weaknesses, the inconsistencies and the lack of understanding of many government people complicate greatly the job of handling the problems of the industry.

R. G. Moser of Patterson, Bellknap & Webb, New York, discussed the present trends in labor relations and the service the society might render to its members in this connection. He pointed out that with the labor problem becoming much more complex, and with government backing labor, management is at a decided disadvantage. By collecting and disseminating information on what is happening within and without the industry, management can have the tools to meet the situation.

Warden F. Wilson, president, Donegal Mfg. Corp., Marietta, Pa., and chairman, Advertising & Public Relations Committee, reported on the results of the society's program extending over the past three years. Purposes of the advertising program include: 1. Informing manufacturers of the advantages of designing and building with steel castings, cast-weld construction and composite fabrication; 2. Impressing these advantages on the minds of designing engineers; 3. Stimulating sales by producing requests from engineers; 4. Distributing useful information on steel castings; 5. Urging considera-

(*Concluded on page* 178)


May 15, 1952
National Pigment Company
Orthodox Street at Delaware River
Philadelphia 37, Pa.
Gentlemen:
We have been using your product, "CASTFLUX" in our Foundry for the past six years and it is about time that we advised you of the results of our experience with this material.
We find that it has been the best developed material that we can use under our solidification characteristics, and it is used entirely on both small and large heads without fear of any carbon pick-up whatever. This has been definitely proven as on many castings we refill the heads after the application of "CASTFLUX" and then finish machine the surface directly under the heads, and it is with satisfaction that we can advise that no carbon pick-up has been experienced. Under practical and technical experimenting around the has proven to be the best all around insulator based established principles set forth.
Yours very truly,
Foundry Superintendent
May 14, 1952
'No Carbon Pic
as a Ladle addition

The 'National' DUAL-PURPOSE

CASTFLUX SB-10 is stocked by the following distributors in your market:

St. Louis, Mo.
M. A. BELL CO.
with Branches in
Houston, Texas
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CASTFLUX **NATIONAL pigment co**

Yes, many successful foundries confirm the **CASTFLUX** *story* ✻

New, improved CASTFLUX SB-10 is a DUAL PURPOSE FLUX, a partly exothermic compound for feeding heads and risers that virtually DOES NOT SMOKE OR CREATE FUME. There is ABSOLUTELY NO CARBON PICK-UP at the neck of the riser or casting itself. It keeps the "pour" hot and liquid for periods of 100% to 200% longer. As a ladle addition it is a wonderful liquidizer—through its cleansing action it de-oxidizes and de-gasifies the metal. It has been universally accepted by the industry for its metallurgically controlled "batch-uniformity". That it increases the yield and improves production at considerable savings has been conclusively proven. You, too, can benefit by a test-trial!

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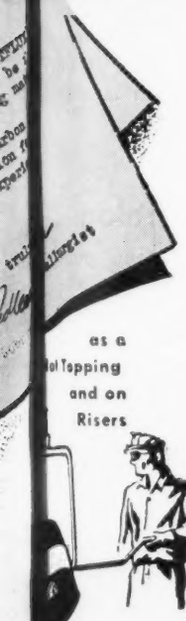

as a
ol Topping
and on
Risers

**Excerpts from actual letters on file*

"...we refill the heads after the application of "CASTFLUX" and then finish machine the surface directly under the heads, and it is with satisfaction that we can advise that no carbon pick-up has been experienced..."

"...never had any difficulty with carbon pick-up or with smoke or fuming from the use of CASTFLUX in our foundry."

"...found CASTFLUX to be free of smoke and fumes and in more than six (6) years have experienced no carbon pick-up in any instance."

"...absolutely no fumes given off by the use of CASTFLUX. To date we have experienced no carbon pick-up in the fed metal below the sink head."

"...on the test made with CASTFLUX, a very definite increase in tensile strength of the metal was noted..."

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***nconditionally* GUARANTEED**

Unless CASTFLUX SB-10 meets with your full approval, material can be returned at no expense within 0 days.

CASTFLUX

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Send for free literature "The Story of CASTFLUX"

C . ORTHODOX ST. AT DELAWARE RIVER, PHILA. 37, PA.

(*Concluded from page* 175)

tion of all methods, thereby helping insure maximum advantages to the manufacturer by use of the best method. The public relations activities consistently have carried out a sound and effective job of disseminating the steel casting story to an ever widening audience important to the industry.

As a result of the joint advertising and public relations effort, Mr. Wilson stated that the society has received special requests for more than 65,000 separate pieces of technical literature offered by the society. The display panels, which have been routed to individual engineering schools and will start on a new routing soon, have produced requests from 4800 individual student engineers for more than 19,000 pieces of society literature. These and many other tangible results prove the value of the program now underway according to Mr. Wilson.

In answer to a number of questions, A. J. McDonald, chief, Castings Section, National Production Authority, Washington, emphasized the changes that are going on in the defense picture. He indicated that plants returning to the production of ingots must clear with NPA if production is 500 tons or less a quarter, and if over 500 tons the customer must consult with that defense agency. Steel castings still are on a 30-day inventory basis, but recently one special class has been given authority to have a 90-day inventory. Efforts are being made to extend this across the board.

Mr. McDonald outlined the situation with respect to various ferroalloys, and indicated that nickel allocations will be about the same in the fourth quarter. Scrap metals generally are in good supply, and an effort is being made to channel alloy scrap to melters of alloy steel. Reduction in pig iron production during the steel strike resulted in abandoning plans for increasing the inventory period. Reduction in merchant iron production for the first seven months as compared with the similar period in 1951 was 17 per cent.

The ferrous foundry industry has been granted certificates of necessity covering tax amortization for $82 million out of applications covering a total of $103 million. The total for steel foundries was $27 million, for malleable iron $18 million and for gray iron $37 million. Ratings for foundry equipment total $18.5 million.

Renegotiation To Affect Few

Frederic W. Kilduff, consultant, New York, discussed the highlights of the renegotiation act of 1951, and indicated that only a relatively small number will be concerned with its provisions. The speaker outlined a number of steps which will correctly present the picture of renegotiable profit, and advised industry to make proper preparation. Some of the factors to be considered include: Separate government and commercial sales; apply so-called exemptions against government sales; apply to the portion which is renegotiable what is known as exclusions; determine if a consolidated report is advisable; allocate all proper costs and expenses; prepare a report on items that will receive special consideration; and accumulate depreciation, etc.

Society safety awards for the 1952 summer contest were announced.

The following companies received plaque awards:

Group 1—1000 to 25,000 man-hours exposure: Deemer Steel Casting Co., New Castle, Del.; Quincy Steel Casting Co., Inc., North Quincy, Mass.; Weatherly Steel Castings Co., Weatherly, Pa.; Eastern Malleable Iron Co., Wilmington, Del.; Tonawanda Electric Steel Casting Corp., North Tonawanda, N. Y.; Hughes Tool Co., Houston, Tex. (these organizations having received similar awards for the past two years). Other companies receiving plaque awards are: Brewster Co. Inc., Shreveport, La.; Vulcan Steel Foundry Co., Oakland, Calif.; Solar Aircrat Co., San Diego, Calif.

Group 2—26,000 to 45,000 man-hours exposure: Malleable Iron Fittings Co., Branford, Conn.; Unitcast Corp., Plant No. 1, Toledo, O.; Key Co., East St. Louis, Ill.; Atlas Foundry & Machine Co., Tacoma, Wash.

Group 3—46,000 to 75,000 man-hours exposure: Chapman Valve Mfg. Co., Indian Orchard, Mass.; Crucible Steel Casting Co., Cleveland.

Group 4—More than 76,000 man-hours exposure: American Steel Foundries, Alliance, O. Lowest frequency rate for the contest month in this group of exposure was 3.0.

Certificate awards were presented to: Dominion Foundries & Steel Ltd., Hamilton, Ont., frequency rate 4.3; American Steel Foundries, East Chicago, Ind., 4.3; Massillon Steel Casting Co., Massillon, O., 4.4; Penn Steel Castings Ca., Chester, Pa., 4.6; General Steel Castings Corp., Eddystone, Pa., 4.8; Duriron Co. Inc., Dayton, O., 6.0; Allied Steel Castings Co., Harvey, Ill., 6.0; General Steel Castings Corp., Granite City, Ill., 6.2; American Steel Foundries, East St. Louis, 6.3; Ross-Meehan Foundries, Chattanooga, Tenn., 6.4.

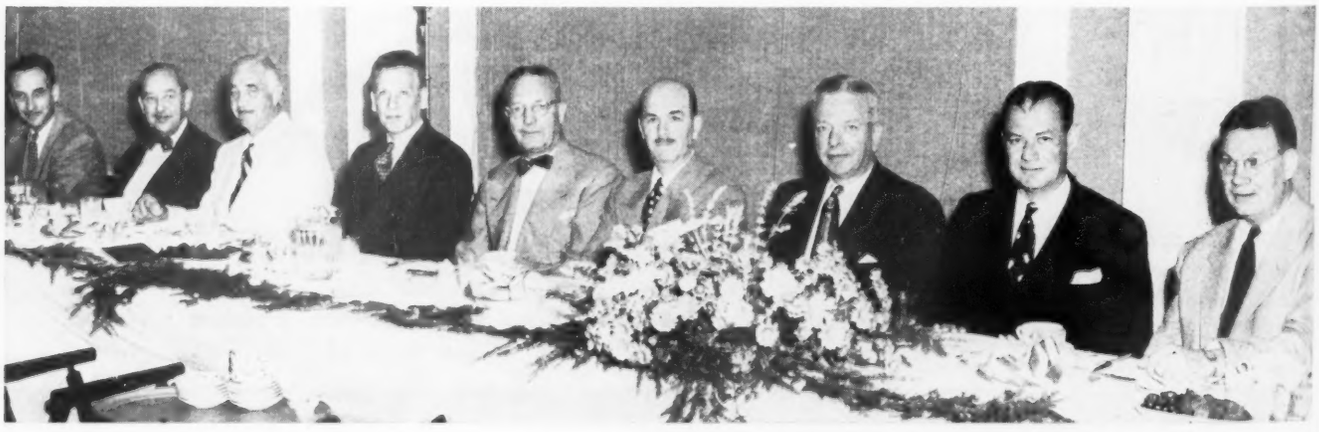
Pelton Steel Casting Co., Milwaukee, 6.4; Texas Steel Co., Fort Worth, Tex., 7.5; Hanford Foundry Co., San Bernardino, Calif., 7.5; Symington-Gould Corp., Depew, N. Y., 8.5; Hartford Electric Steel Corp., Hartford, Conn., 8.8; Crane Co., Chicago Works, Chicago, 9.0; National Supply Co., Torrance, Calif., 9.2; Monroe Steel Castings Co., Monroe, Mich., 9.4; Sumner Iron Works, Everett, Wash., 9.7; National Malleable & Steel Castings Co., Melrose Park, Ill., 9.9; Pittsburgh Steel Foundry Corp., Glassport, Pa., 10.0.

Cumulative frequency rate for the industry for the first seven months of 1952 is 25.0, compared with 28.5 in 1951.

A splendid address on maintaining our freedom was presented at the final luncheon by William J. Grede, president, Grede Foundries Inc., Milwaukee, and president of the National Association of Manufacturers. Mr. Grede pleaded with his audience to do everything possible to get out the vote in the November election if we are to stop the trend which is sapping our freedom.

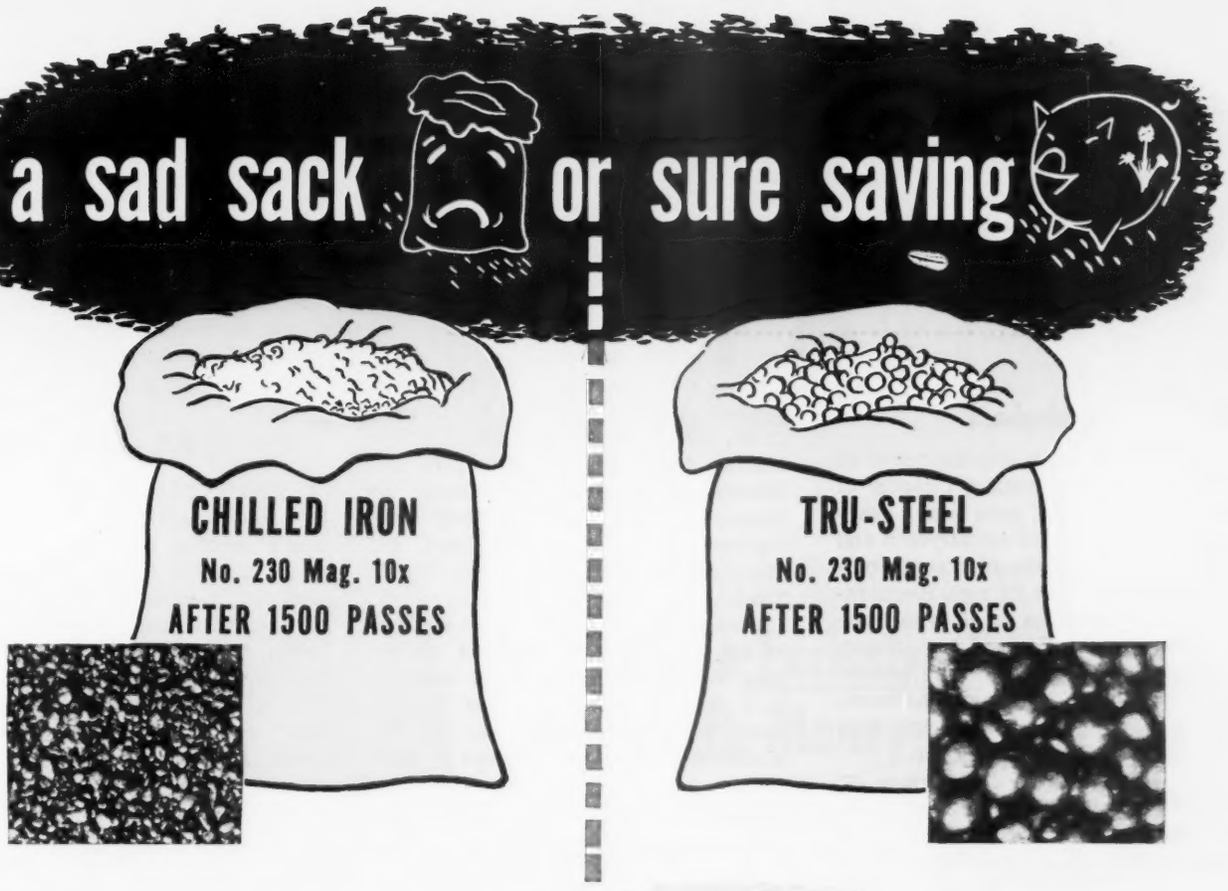
British Pattern Catalog

A pattern catalog has been published by G. Perry & Sons, Hall Lane and Thornton Lane, Leicester, England, to illustrate various types of pine, mahogany, iron, brass and aluminum patterns produced by the firm. The 20 pages of "Over 60 Years of Pattern Making" contain photographs of patterns for many kinds of castings, of various sizes and shapes.



Speakers' table at luncheon session of the SFSA annual meeting included, left to right: Ross L. Gilmore, A. J. McDonald, A. S. Breithaupt, William J. Grede, H. A. Forsberg, Frederic W. Kilduff, C. F. Barchfield, Warden F. Wilson, and F. Kermit Donaldson

a sad sack or sure saving



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TRU-STEEL SHOT IS STILL ROUND AND SOLID

It's sad but true. When abrasive starts to crumble, it loses its cleaning efficiency. Through annealing, drawing and other processes, the life of some iron abrasives has been increased so they can be sold as premium abrasives. However, a true steel shot is the only abrasive that NEVER SHATTERS. That's why Tru-Steel Shot lasts longer. It is made of high carbon steel that has received a FULL heat treatment . . . the kind of steel that has proved its stamina in parts like bearings, hammer heads, etc.

Tru-Steel maintains its size and shape longer instead of breaking into the millions of sharp pieces that abrade the wearable parts of your cleaning machine. As a result, you not only have less abrasive to buy, but you also make large savings in replacement parts and maintenance labor. Send for a trial order of Tru-Steel Shot today.

Bulletin 59-A shows where the average cleaning dollar is spent and how savings can be made. Send for your copy today.

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TRU-STEEL SHOT

Activities of Foundry

GROUPS

Birmingham

ANNUAL outing and barbecue of Birmingham District Chapter of AFS, held Sept. 13, gets better every year. There were 775 foundrymen and friends present at the nineteenth outing held at Cascade Plunge. Registration at the entrance of all who came provided the opportunity for officers to meet and greet out-of-city guests. Fred K. Brown, chapter chairman, was all over the place seeing that everyone was well cared for.

Former chairmen Dr. James T. MacKenzie, Morris Hawkins, Tom H. Benners, Joe T. Gilbert and C. P. Caldwell also were busy entertaining guests and introducing visitors throughout the day. The dinner, one of the tastiest, featured barbecued chicken and spareribs.

More than 30 attendance prizes, valued at $400 to $500, were awarded. Some of the winners were W. J. Brodie, C. Long, E. J. Carter, C. J. Crozer, R. E. Allen, L. E. Horn, G. Smith, C. H. Wayley, L. L. Stone, Don Matthieu, O. Allred, H. P. Davies, J. L. Jones, J. E. Coker, C. W. Moore, H. H. Caldwell, J. Hardin, B. Spradlin, W. Mason, S. D. Moxley, W. Love, Dave Williams, H. Strickland, R. Travis, J. Neal, Bob Cardwell, L. Carl, J. Whelchel, C. Chaney, Bill Dunsmore and Fred Steel.

Entertainment committee in charge of all arrangements included chairman William K. Bach, Ross Martin, V. I. Byford, Wes Estes, Joe T. Gilbert and Henry Guthrie.—*J. P. McClendon, Stockham Valves & Fittings.*

Eastern New York

A PLANT visitation at the Rensselaer Valve Co., Cohoes, N. Y., was featured as part of the program for the Sept. 16 meeting of Eastern New York Chapter of AFS. About 20 foundrymen toured the iron and brass foundries and machine shop. Points of interest were the company's sand mulling and distribution system, cupola charging apparatus and its method of making green sand cores.

The evening session was held at Circle Inn, Latham, N. Y., at which Leigh Townley, Adirondack Foundries & Steel, Watervliet, N. Y., and chapter chairman, presided. Speakers were Earle Aumic, supervisor of planning and wage rate and methods, Schenectady Foundries, General Electric Co., and Ray Willey, leader of standards at the Schenectady Foundries, General Electric Co. Mr. Aumic discussed "Foundry Pre-Planning from Blueprint," and Mr. Willey presented a new method of mold evaluation.—*Harold H. Bodwell, General Electric Co.*

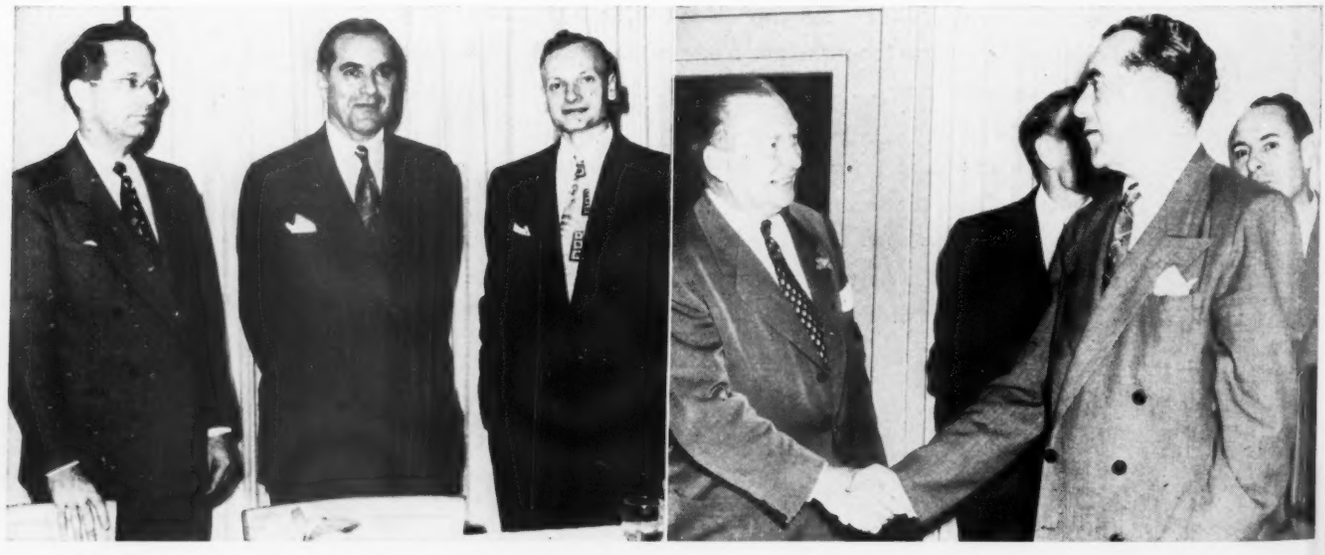
Wisconsin

APPROXIMATELY 300 members and guests were present at this year's opening meeting of the Wisconsin Chapter of AFS. Of the four sectional meetings arranged, nearly 100 members heard a talk by Edward Leicht, Plastics Engineering Co., Sheboygan, Wis., who spoke on "Shell Molding as Applied to Jobbing Foundries." Mr. Leicht was assisted by Frank Krause and Kenneth Brookschmidt of the same company. Shell molds for a frying pan were given to those present as a sample for study. Harry Seeboth, Milwaukee Bronze Casting Co., was chairman of the meeting.

H. J. Jacobson, Industrial Pattern Co., Chicago, talked on "New Methods in Metal Pattern Making," with Ralph H. Schaper, Wisconsin Appleton Co., acting as chairman.

A sound film, "Mechanization in Molding," with narration by C. V. Nass, vice president and general man-

(*Continued on page* 182)



CENTRAL MIICHIGAN Chapter of the AFS held its first meeting of the 1952-53 season at the Kalamazoo Country Club, Sept. 16. Left to right are chapter chairman David Boyd, Engineering Castings Inc.; Speaker William Romanoff, H. Kramer & Co., Chicago; technical chairman Kenneth Rhoads, Engineering Castings Inc.; and Collins L. Carter, president, Albion Malleable Iron Co., welcoming Mr. Romanoff

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JOY WG-9 COMPRESSOR

These Exclusive Features are worth Money to you!

Only the JOY WG-9, in its class, offers replaceable crosshead guides and cylinder liners, and full force-feed lubrication—features that will save you money in operating and maintenance costs. Unique truncated pistons and angled over-size "Dual-Cushion" valves assure higher valve capacity, better heat dissipation, lower air friction and elimination of valve pounding.

The WG-9 is a water cooled, double acting, single stage, heavy duty compressor for use where medium amounts of air are needed or for supplementary service in high air-requirement industries. Vertical design minimizes vibration and cuts required floor space. Foundation is but a simple concrete pad.

15 SIZES • 30 to 150 lbs. psi • 172 to 881 CFM

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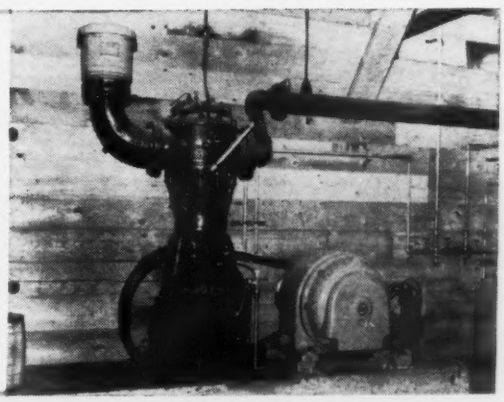
Meet any Need

High and low pressure compressors, oil free compressors, boosters and vacuum pumps—Joy builds a type and size for every need. • Let us handle *your* air-supply job.



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EASTERN NEW YORK Chapter of the AFS met Sept. 16 at Circle Inn, Lathams, N. Y., to hear talks by two speakers at its opening meeting of the season. At left is William Stevenson, chapter secretary-treasurer, showing a national AFS office diploma awarded to the chapter for meeting its membership quota. Below left, left to right, are: Ken Eckert, Eddy Valve Co., and James Kiesler, Ray Willey and Ed Lawrence, General Electric Co. Below right, left to right, are: Earle Aumic, Harry Williams, William Fraboski and Edward Stresino, all of General Electric Co. Photos by Howard H. Bodwell, General Electric Co.

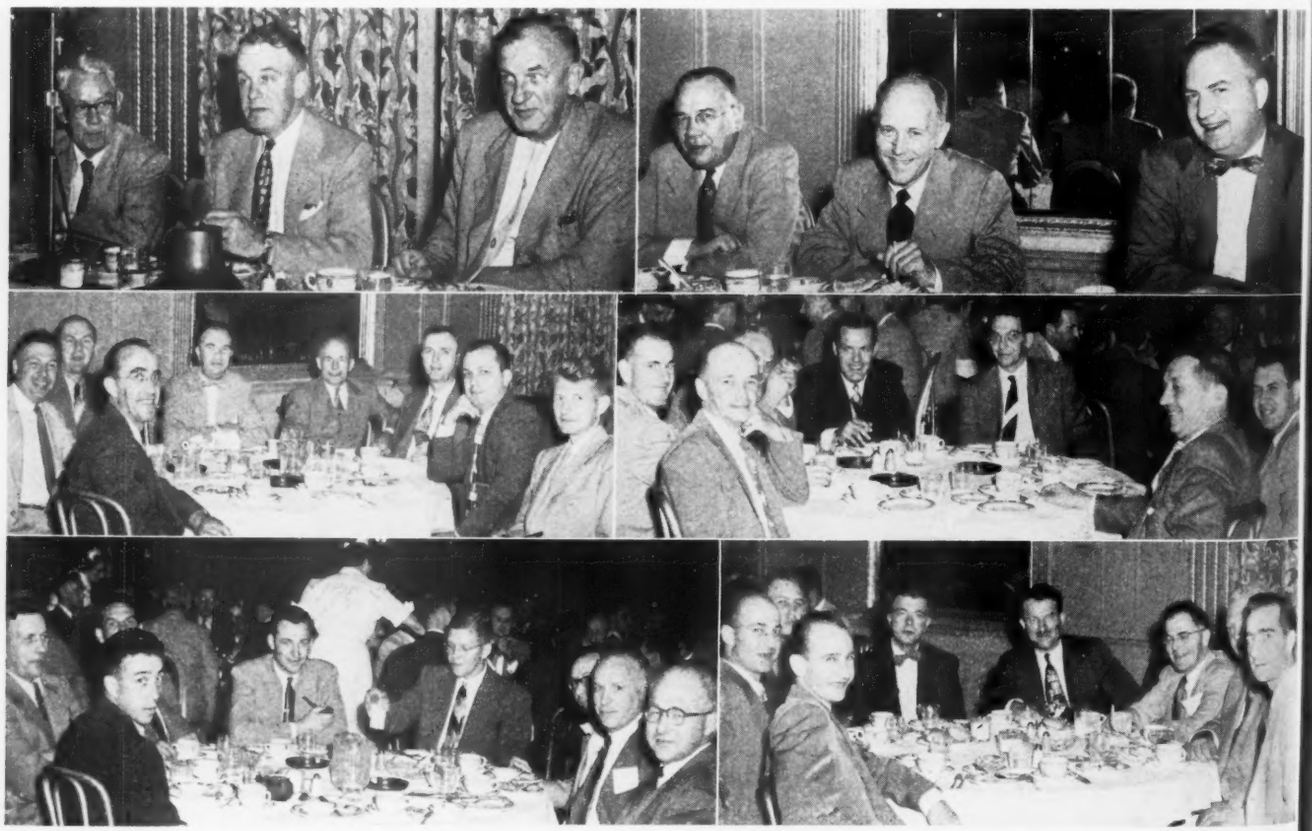
(*Continued from page* 180)

ager, Beardsley & Piper Division, Pettibone Mulliken Corp., Chicago, attracted a good attendance. The film showed many types of high-production molding units at several large foundries, and Mr. Nass explained how time and labor are saved in both molding and shakeout operations. Meeting chairman was C. W. Schwenn, Brillion Iron Works Inc.

"Inspection of Castings from the Consumers' Standpoint" was the subject of a talk by Joseph Trimarco, inspection technician for Caterpillar Tractor Co., Peoria, Ill. He explained that his work consists chiefly in assisting various casting vendors throughout the country to improve the quality of their castings from an inspection standpoint. Chairman for this discussion was Walter Punko, Wehr Steel Co.

At the chapter's Oct. 3 meeting, held at Hotel Schroeder, Milwaukee, William J. Grede, president of Grede Foundries Inc., addressed members and guests on "America, Frontier of Freedom." Chapter President Joseph G. Risney, in introducing Mr. Grede, told of his entering the foundry business. Mr. Grede left school in 1917 and obtained work in a small foundry in Decatur, Ill. After three years of foundry work, he purchased the Liberty Foundry in Wauwatosa, Wis., with a small down payment and 15 years to pay the balance. In the succeeding years, Mr. Grede's interests have been many and varied. In

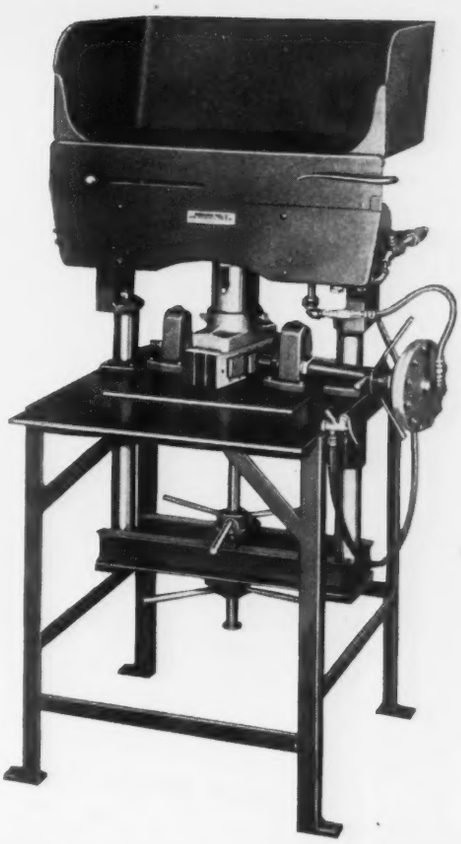
(*Continued on page* 184)



WISCONSIN Chapter of the AFS held its first meeting of the season at Hotel Schroeder, Milwaukee, with about 300 members and guests attending. At top, left to right, are: R. C. Woodward, Bucyrus-Erie Co., past chapter president; J. G. Risney, Risney Foundry Supply Co., newly elected president; H. E. Ladwig, Allis-Chalmers Mfg. Co., past president; M. C. Franhard, Delta Mfg. Co., chapter director; P. C. Fuerst, Falk Corp., program chairman, and L. H. Decker, Allis-Chalmers Mfg. Co., director. The other views show table groups. Photos by Walter V. Napp, Delta Oil Products Co.

Redford CORE BLOWERS

Assure MAXIMUM Production With MINIMUM Effort



THE NO. 2 STATIONARY MAGAZINE TYPE

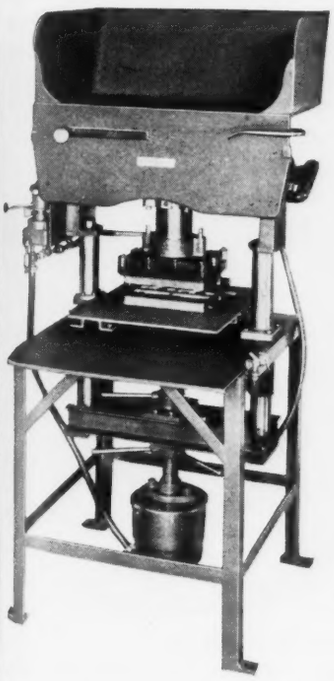
8 OUTSTANDING FEATURES:

1. Large stationary work area.
2. Large sand supply hopper.
3. Stationary sand magazine.
4. Easy accurate locating of core boxes.
5. Quick change magazine heads.
6. Quick adjustment for different height core boxes.
7. Quick change, fully adjustable, vertical clamping attachment.
8. Actuating one handle clamps the core box, blows the core and releases the core box, in two seconds.

CAPACITY: Cores up to 5#

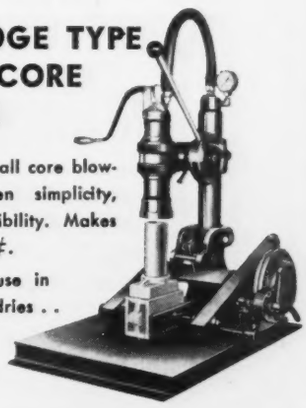
Write for Specification Bulletin "F"

THE No. 2-D CORE BLOWER



A fast and accurate DRAW TYPE core blower for small work—has stationary sand magazine and many additional features assuring maximum production. Quickly adjusted to accommodate core boxes not requiring the draw feature. Can be equipped with clamping attachment for vertically split core boxes.

THE CARTRIDGE TYPE BENCH CORE BLOWER



The original small core blower . . Proven simplicity, speed and flexibility. Makes cores up to 2#.

Thousands in use in American Foundries . .

Write for Specification Bulletin "G"

SIX FEATURES:

1. MAXIMUM SAFETY—Operator must use both hands at once to clamp core box and blow cores.
2. ACCURATE DRAW—Stationary sand magazine and long lead on draw table shaft assure accurate draw.
3. ADJUSTABLE LENGTH OF DRAW—Quickly changed without changing height of table.
4. FLEXIBILITY—Easy adjustments permit use of draw feature even on short run jobs. Draw type magazine heads having removable blow plates are interchangeable with regular No. 2 magazine heads.
5. CORE BOX VIBRATION—Controlled by keeping draw valve handle depressed during draw operation.
6. PROVEN—The No. 2-D is being used in leading foundries everywhere. Backed by the Redford reputation for quality equipment.

Write for Specification Bulletin "D"

Redford IRON & EQUIPMENT CO.

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"Certified" Abrasives
clean more castings per dollar!

"Certified" Samson Shot and Angular Grit are made *extra-tough* by a special *automatically controlled* hardening process. They wear longer, can be used over and over again . . . actually clean more castings per dollar! Save money . . . switch to "Certified" Abrasives.

Experienced Foundrymen say:
Always specify "Certified"
ACCEPTED AND USED FOR OVER 55 YEARS

PITTSBURGH CRUSHED STEEL CO., Pittsburgh, Pa.
STEEL SHOT AND GRIT CO., Boston, Mass.
MEMBER FEMA

(*Continued from page* 182)

December, 1951 he was elected president of the National Association of Manufacturers and last May he was elected president of the National Council of the YMCA.

Mr. Grede's talk concerned labor conditions, inflation and politics.—*John E. Hubel*

New England

FIRST fall dinner meeting of the New England Foundrymen's Association was held at Hotel Somerset, Boston, Sept. 10, with 75 members and guests attending.

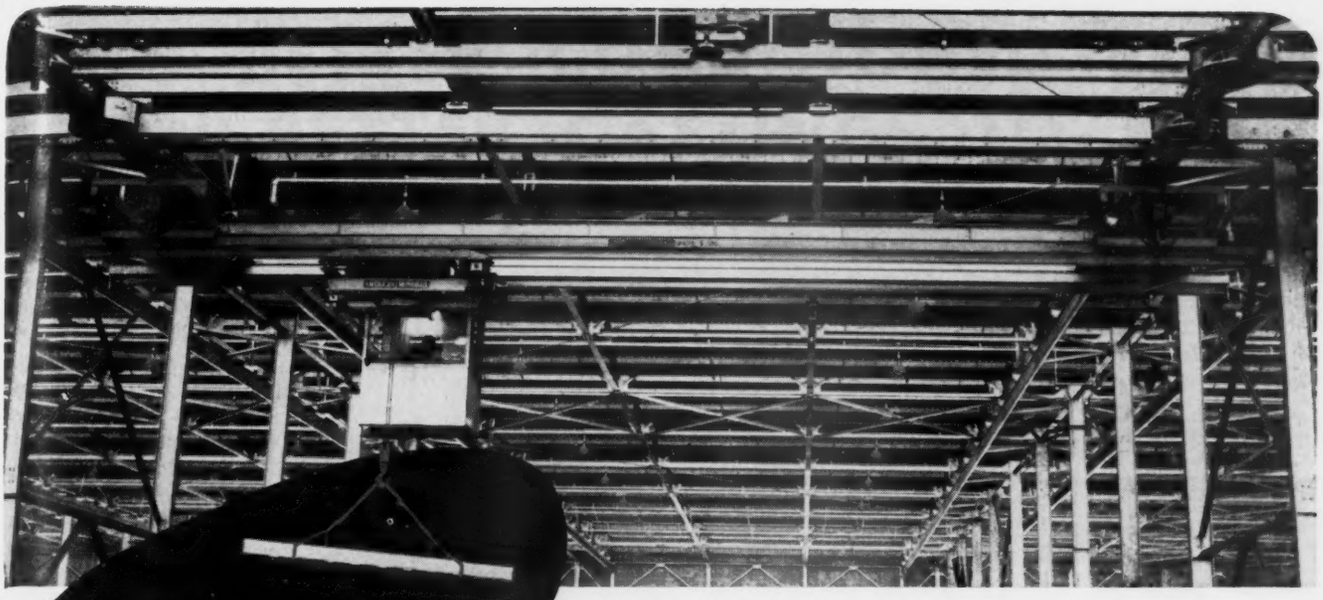
Albert Nutter, LeBaron Foundry Co., presided in the absence of President Frank Elliot, Westinghouse Electric Corp. J. Healey, director of the special commission on taxation for the Commonwealth of Massachusetts, was the speaker. He talked on the problems, activities and procedures followed in state legislative bodies for states the size of Massachusetts.—*Myron DeHollander, General Electric Co.*

Northwestern Pennsylvania

THERE were 85 members and guests present at the opening meeting of Northwestern Pennsylvania Chapter of AFS which was held at the Erie Moose Club, Sept. 22. Fred J. Carlson, Weil-McLain Co., Erie, chapter chairman, opened the meeting and briefly outlined the activities for the coming year. He then introduced Richard Herold, foundry products department, Borden Co., who spoke on "Shell Molding."

(*Continued on page* 186)

NORTHWESTERN PENNSYLVANIA Chapter of the AFS heard Richard Herold, Foundry Products Dept, Borden Co., speak at its first meeting of the season, Sept. 22, at the Erie Moose Club, Erie, Pa. Chapter chairman Fred J. Carlson is on the left, Mr. Herold in the center, and chapter secretary Bailey Herrington, Hickman, Williams & Co., on the right

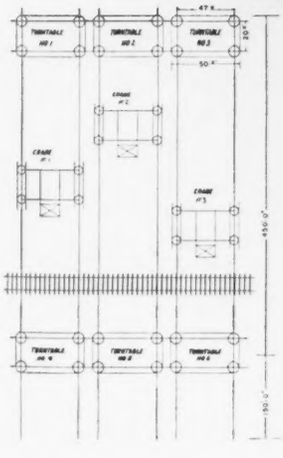


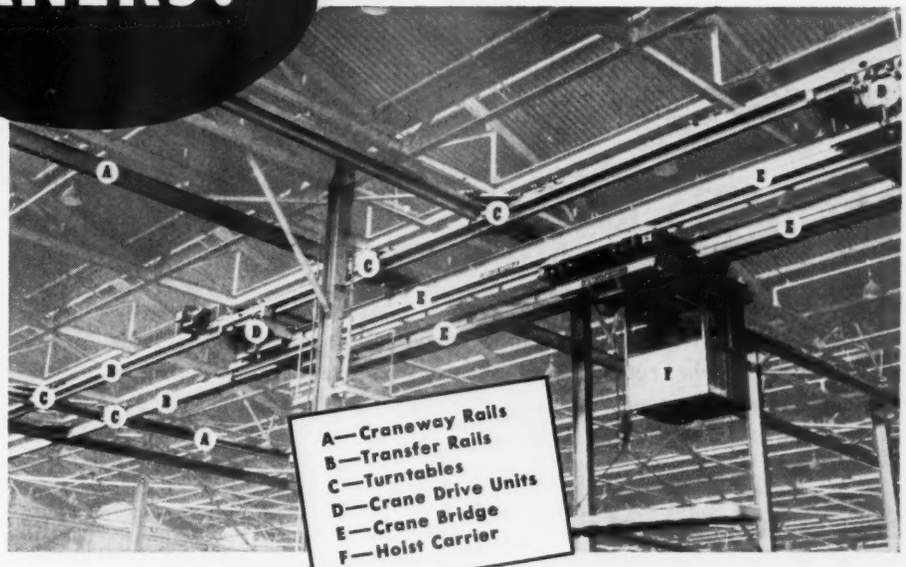
A CRANE that TURNS the CORNERS!

Imagine a crane that shifts from its craneway to another via 90° turntable—then shifts again at 90° to travel another craneway. It's like driving a car to the middle of an intersection, then instead of just the front wheels turning, all wheels turn at a right angle and the car travels sideways down the side street.

This crane offers fast hoist hook service throughout maximum areas without load transfer from original pick-up.

An American MonoRail engineer will gladly tell you now about its application.





THE AMERICAN MONORAIL COMPANY

13104 ATHENS AVENUE **CLEVELAND 7, OHIO**

(*Continued from page* 184)

Mr. Herold covered the subject thoroughly and the question and answer period which followed brought out considerable information on various aspects of the types and kinds of sand used, resin and mixtures. In addition, advantages and disadvantages of the equipment available for making shell molds was discussed as well as methods of clamping the shells together for pouring.

The meeting included the showing of a technicolor film, "The Invisible Shield," recently produced by Claude B. Schneible Co., which illustrates and explains dust and fume control in the foundry industry.—*Roy A. Loder, Erie Malleable Iron Co.*

Southern California

TO OPEN the current chapter season, 130 members and guests of Southern California Chapter, AFS, were present at the Rodger Young Auditorium, Los Angeles, Sept. 12. President Harold Pagenkopp, Angelus Pattern Works, Huntington Park, Calif., presided at a short business meeting. Hubert Chappie, National Supply Co., who is program chairman, introduced S. C. Massari, technical director of AFS who discussed "Principles of Gating." In addition, he showed the film, "Effect of Gating Design on Casting Quality," which was produced by Battelle Memorial Institute in collaboration with the society. On Aug. 16 the chapter held its 15th summer outing and stag at the Lakewood Country Club, Long Beach. The afternoon and evening were enjoyed by a record attendance of 500 members and guests. Ed Gordon won low gross golf honors over a field of 100 participants, and F. H. Hauss was winner of the blind bogey division. Other contests included a baseball game between foundrymen and vendors, and a horseshoe pitching contest.

Afternoon refreshments were efficiently handled by Jim Oliva, Oliva-Tatro Co.; Tony Tuzzolino and Frank Olivér, Overton Foundry; and Amos Culp, West Coast Foundry & Mfg. Co. An excellent dinner and floor show concluded the day. Robert M. Ditmore, Federated Metals Division, chairman of the entertainment committee, and his fellow committee members deserve the compliments of the chapter for the planning and efficient execution of the affair.—*K. F. Sheckler, Calmo Engineering Co.*

Chesapeake

CHESAPEAKE Chapter AFS, through its Educational Committee, has arranged a "Cupola Operations" seminar as part of its 1952-53 program. Sessions will be held Nov. 28 and 29 at the Engineers Club, Baltimore. Lewis H. Gross, American Radiator & Standard Sanitary Corp., Baltimore, and chairman of the Educational Committee, announce the program as follows:

Friday, Nov. 28

6:30 p.m.—Cocktails and dinner.

8 p.m.—"Aspects of Basic Cupola Operation," by William H. Owen, Harbison-Walker Refractories Co., Pittsburgh.

Saturday, Nov. 29

11 a.m. — Educational films: "Preparing a Cupola for Charging"; "Charging and Operating a Cupola."

12:15 p.m.—"Cupola Fuels," by H. W. Lownie Jr., Battelle Memorial Institute, Columbus, O.

1:45 p.m.—"Acid Cupola Production and Refractories," by Tom E. Barlow, Eastern Clay Products Division, International Minerals & Chemical Corp., Chicago.

Reading

THE history of metals from the Stone Age to the Atomic Age was described by G. A. Pealer, General Electric Co., Elmira, N. Y., during the Sept. 16 meeting of the Reading Foundrymen's Association held at the Berkshire Hotel, Reading, Pa.

Mr. Pealer pointed out that, al-

(*Continued on page* 189)

sil-gan

GUN MIX ▲ HAND PATCH

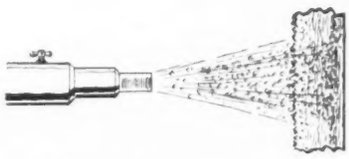
NOW—A GUN MIX THAT WORKS

The one baffling problem of gun application of monolithic linings has been the high percentage of drop under the cupola.

This little girl is having fun. Her ball bounces easily because it is round.

Don't Play "O'Leary" on your cupola lining by bouncing round pellets against it with a large percentage falling to the floor.

PLAY DARTS INSTEAD



With the unique, long, finger-like cleavage of SIL-GAN you are practically "Playing Darts". When the sharp angular particles of SIL-GAN strike the wall of the cupola, they penetrate and stick with maximum density. Ceramic Engineers recognize the importance of density in any refractory material.

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Our Service Men are qualified and can assist you in cutting your refractory costs up to fifty per cent. The Agent in your locality will gladly call and explain further. Phone them or write direct—No obligation, of course.

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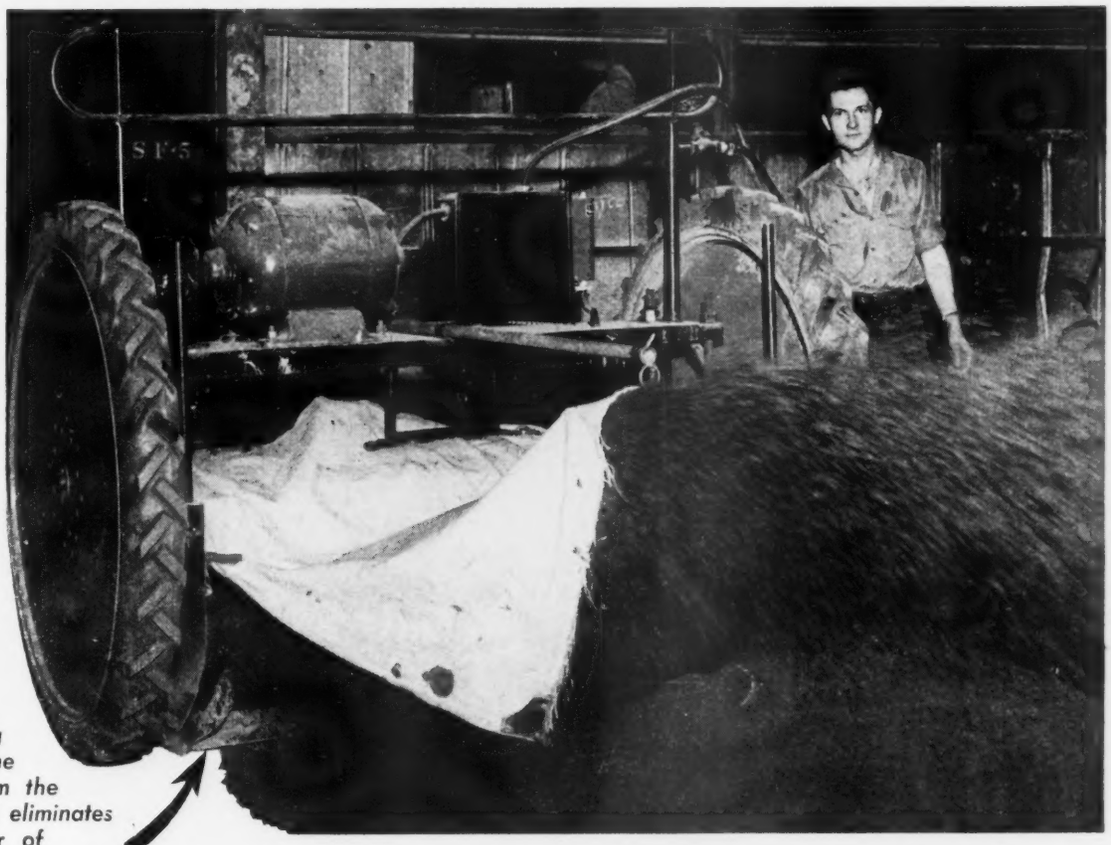
DOES BETTER CONDITIONED SAND MEAN BETTER CASTINGS TO YOU?



This drag scoops the sand from the floor and eliminates any layer of unconditioned sand

This Moulders' Friend was rolled off a truck on to the floor of a North Carolina foundry where it conditioned all of the moulding sand without any rearrangement of the heaps. The Moulders' Friend will fit your foundry too.

THE MOULDER'S FRIEND GIVES YOU THOROUGHLY CONDITIONED SAND

The thousands of flat tempered steel wires in the brush revolving at high speed pick up small particles of used sand, added bond and moisture and blend them thoroughly. This process is so thorough that either clay bond or new moulding sand is blended with the heap successfully and a minimum of moisture is required. A portable screen and water dispenser are valuable added features.

THE BRUSH DOES THE JOB

●

THE MOULDER'S FRIEND SAVES MONEY . . .

capacity two tons per minute—one man operation—simple construction—easy to buy and use—pays for itself with better castings and labor saved.

Investigate The Moulders' Friend today. See one in operation.

"The Moulders' Friend"
Dallas City, Illinois

"No other furnace could do the job"

This foundry casts parts for corrosion- and heat-resistant valves . . . pressure-tight castings of hard-to-handle nickel alloys and stainless steels.

Requirements are *tough*. Shapes cast are complex, with complicated coring. Analysis must be controlled within extremely close limits, must be absolutely uniform throughout the melt. Because any variations in composition might be a starting point for corrosion, welding repairs are undesirable.

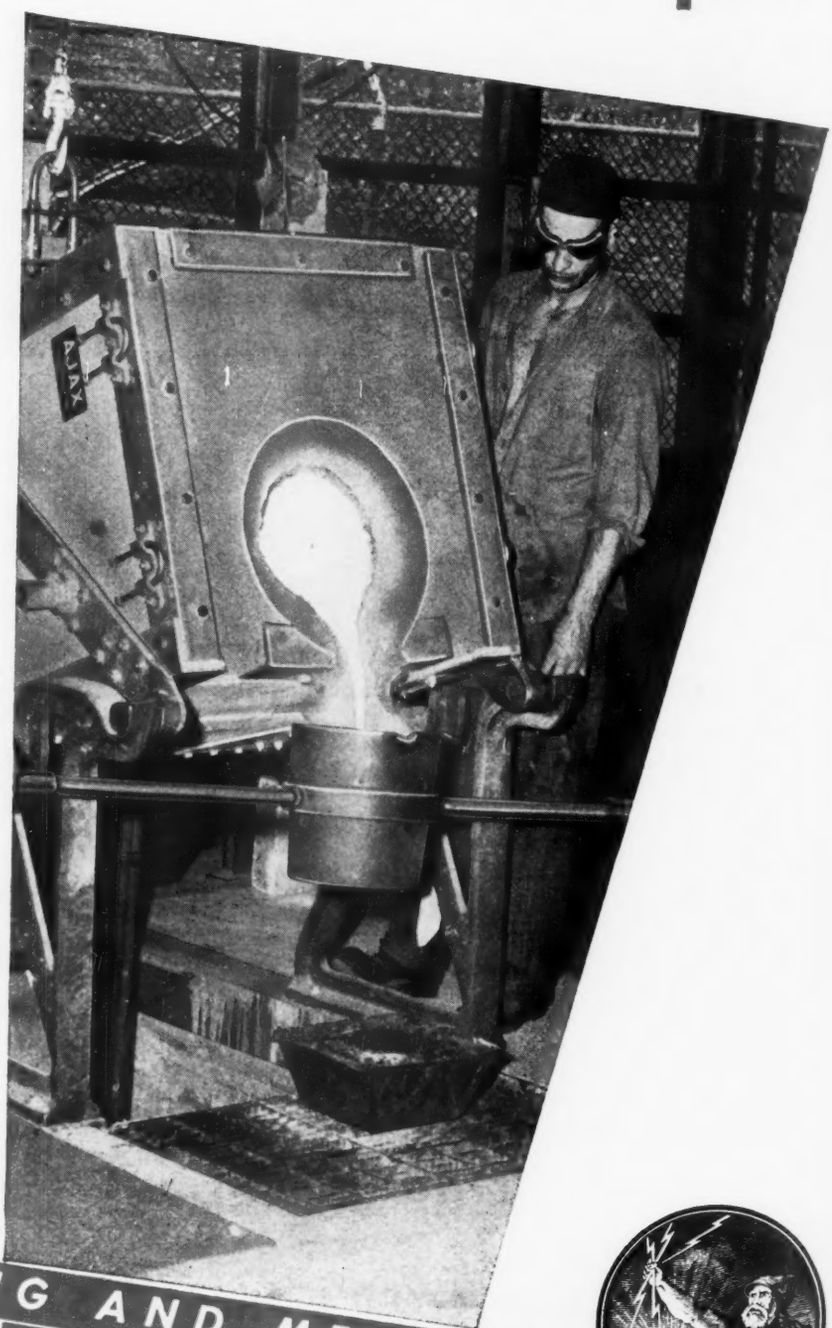
Ajax-Northrup high frequency furnaces meet these requirements with ease. Pouring temperatures are controlled within ± 20 deg.F., each melt being poured at the point of optimum fluidity. Analysis of every element is controlled within 0.25%, carbon kept as low as 0.03%, when desired. Uniformity is assured by the inherent stirring action of induction furnaces.

The resulting castings are so consistently sound that *repair welding has been eliminated!* Parts with even minor defects are so few that they are scrapped instead of being welded.

Output is high. With never more than one 600-pound furnace in operation, on a two-shift basis, this small foundry pours almost 250,000 pounds of high-melting point alloys a month! No wonder the foundry superintendent says "No other furnace could do the job."

Ajax-Northrup can do a better job for you, too. Write us today for details.

SEND FOR NEW INDUCTION HEATING AND MELTING BULLETIN



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FOR HEATING AND MELTING

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AJAX ELECTRO METALLURGICAL CORP.
AJAX ELECTRIC FURNACE CORPORATION
AJAX ELECTRIC COMPANY, INC.
AJAX ENGINEERING CORPORATION

(*Continued from page* 186)

though the first intentional production of iron occurred about 1500 BC, in the area between the Black and Caspian seas, the Chinese first cast iron commercially about 500 BC.

President James Hinkley, Dick Bros. Inc., welcomed the 150 members and guests who attended the meeting. Included in the group were 50 industrial arts high school teachers from Berks, Lancaster, Lebanon, Lehigh and Montgomery counties. A film entitled "Shining Rails" concluded the meeting.—*W. I. Cassidy*

Central Michigan

OPENING the current chapter season, Central Michigan Chapter of AFS met Sept. 16 at the Kalamazoo Country Club, Kalamazoo, Mich. Dave Boyd, Engineering Castings Inc., Marshall, Mich., and chapter chairman, greeted all the members. Technical chairman, Ken Rhoades, also of Engineering Castings, introduced the speaker, William Romanoff, vice president and technical superintendent of H. Kramer & Co., Chicago. Mr. Romanoff selected "Brass and Bronze" as his subject and approached it from the practical standpoint. His discussion created a great deal of interest, even from the ferrous foundry members. — *Don Huizenga, Albion Malleable Iron Co.*

Twin City

FEATURED at the Sept. 16 meeting of Twin City Chapter of the AFS was W. T. Bean Jr., Detroit, who was introduced by Robert C. Wood, Minneapolis Electric Steel Co., as the "Will Rogers of the foundry industry." Mr. Bean, with his great enthusiasm for the future of the foundry industry, inspired the 107 members present.

Mr. Bean stated that a well designed casting is compatible with good foundry practice. To achieve this the engineer should think out his design, model it and then discuss it with foundry superintendent, patternmaker and others concerned until all are satisfied. Then the design can be put on paper.

He believes good casting design is simple for better stress distribution. He suggested thinking of *design* as *shape*. Gradual changes in section thickness and contour are more easily cast for directional solidification, metal flow and shakeout. Shape or contour establishes stress distribution, the maximum degree of change is the point of maximum stress and stress distribution establishes load.

In the speaker's opinion, the value of stress analysis through the use of strain gages and brittle lacquer cannot be over-emphasized. He also pointed out that as mechanical properties of metals increase, high stress-susceptibility is created and hence better casting design is needed.

Pat Patton of American Hoist & Derrick Co., St. Paul, introduced Pierre Titeot from France and Laurens Jobse from the Netherlands. These gentlemen are exchange students currently working at American Hoist & Derrick. Mr. Titeot is a member of the foundrymen's society in France.

One of the chapter's Educational Committee goals this season is the organization of scholarship awards for promising students in the area. —*Robert Mulligan, Archer-Daniels-Midland Co.*

Tri-State

PATTERN Making in Foundry Work," was discussed by Albert F. Pfeiffer, Allis-Chalmers Mfg. Co., Milwaukee, at the Sept. 12 meeting of Tri-State Chapter of the AFS at which 52 members and guests were present.

Mr. Pfeiffer brought along an interesting collection of exhibits which he used together with slides to point up his recommendation that wooden models of complicated castings be made for study before designing pattern and corebox equipment. These models give foundrymen and engineers a clear picture of the finished product and, he related, have saved many expensive pattern changes.

In cases where several foundries produce castings from the same pattern equipment, Mr. Pfeiffer recommended Allis-Chalmers' practice of calling in representatives of foundries concerned so that ample consideration can be given to their existing facilities before pattern equipment is designed.—*F. E. Fogg, Acme Foundry & Machine Co.*

Chicago

AT ITS opening meeting of the 1952-53 season, Oct. 6, the Chicago Chapter, AFS, established a new attendance record. The Chicago Bar Association served 315 dinners.

Two of the important factors contributing to this showing were the meeting topic and the excellent qualification of the speaker. Subject was "The Shell Molding Process—Present and Future." Today this new process is attracting the interest of foundrymen, patternmakers, equipment manufacturers and materials suppliers. Speaker was Bernard N. Ames, senior metallurgist and head of the casting development and foundry practices section of the materials laboratory, New York Naval Shipyard, Brooklyn, N. Y. Since 1947, when the shell molding process was first heard of in this country, Mr. Ames has been in the forefront of those investigating

FAREWELL PARTY: When J. A. de Bondy, organizer and first president of the Manitoba Chapter of the American Society for Metals, left Winnipeg, Man., the chapter he had formed presented a desk clock to him. Former vice president of Manitoba Steel Foundries Ltd., he has entered the profession of engineer and consulting metallurgist in Toronto, Ont. In the photograph are, left to right, G. E. Mason, chairman of Manitoba Chapter of ASM, Mr. de Bondy and J. Johnson, past president of Manitoba Chapter

BIRMINGHAM Chapter of the AFS held its 19th annual outing and barbecue Sept. 13. Left to right are Gene Whelchel, entertainment committee, American Cast Iron Pipe Co.; Fred K. Brown, Fred K. Brown Co. Inc., chapter chairman; John F. Drenning, Kerchner, Marshall & Co., secretary-treasurer and William Bach, cochairman of the outing

and appraising the new technique.

Chapter President John H. Owens, Chicago district sales manager, Harbison-Walker Refractories Co., presided over the general portion of the meeting. Guests of the chapter were ten foundry and shop instructors in Chicago trade and technical high schools. Several students were present.

W. N. Davis, director of the AFS Safety and Hygiene and Air Pollution program, announced and explained four safety training courses to be held at the Sherman Hotel, Chicago, in November, January, February and March. If these prove successful, they will be put on in other sections of the country.

Roy W. Schroeder, assistant professor of foundry and pattern laboratory, Navy Pier Branch, University of Illinois, and chairman of the chapter's Educational Committee, announced that this year's lecture course, to be held between Mar. 16 and Apr. 2 will be on "Gating and Risering."

John A. Rassenfoss, research metallurgist, American Steel Foundries, and chapter vice president, presided over the technical session and introduced Mr. Ames. In his formal presentation, the speaker described the shell molding process in considerable detail and discussed its application. This followed closely the article in FOUNDRY, June, 1952, authored by himself and two associates.

Next meeting of the chapter, Nov. 3, will be of roundtable character. Gray Iron division will hear a discussion on "The 3 P's of Ductile Iron." —*Erle F. Ross.*

Northeastern Ohio

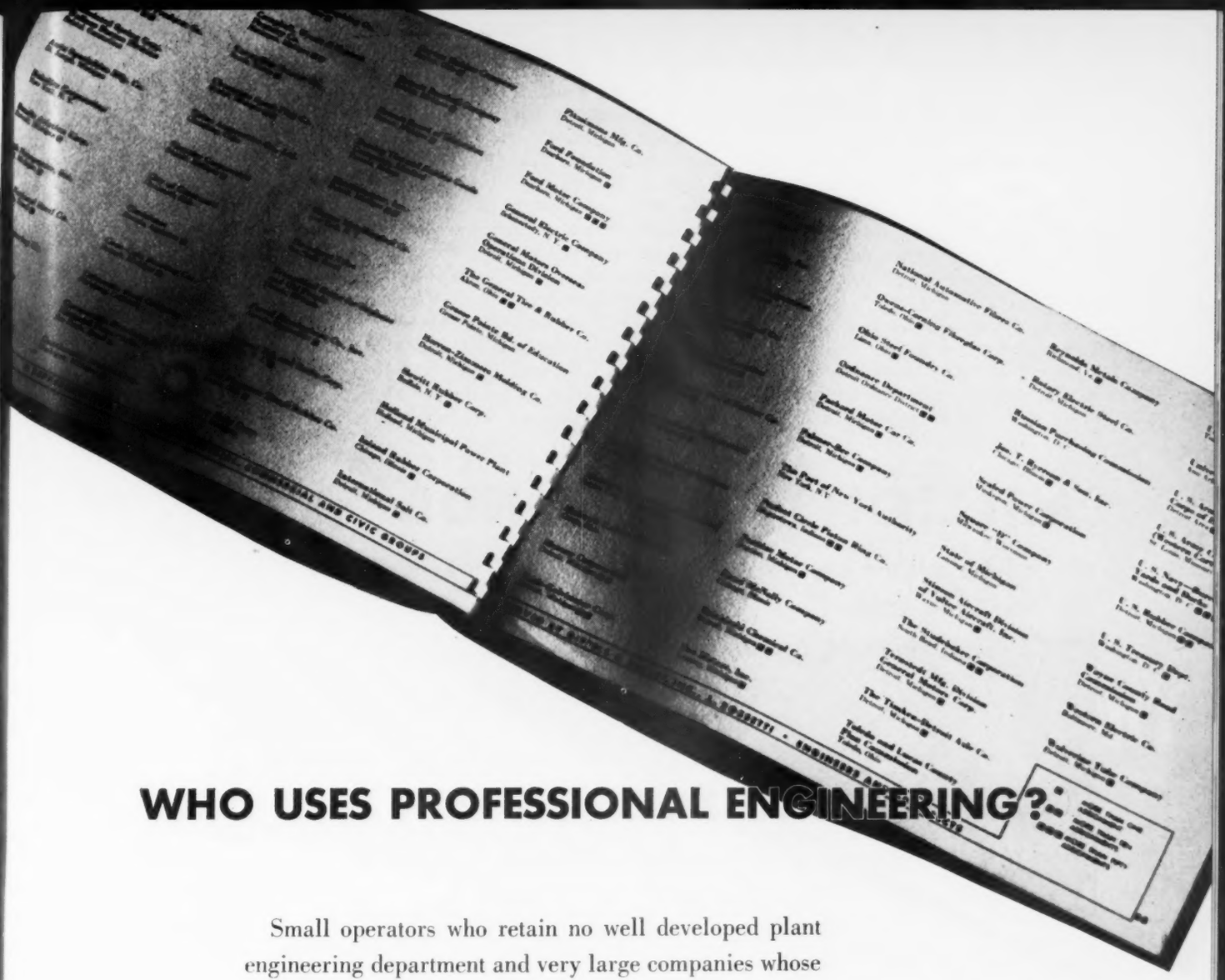
ATTENDANCE of nearly 325 members and guests at the Oct. 9 meeting of Northeastern Ohio Chapter of the AFS, at Tudor Arms Hotel, Cleveland, marked a new record for the group's technical gatherings. After dinner, those in attendance saw "The Invisible Shield," an interesting and instructive color film produced by Claude B. Schneible Co., Detroit, to show how foundries can avoid air pollution in their own shops and in the communities in which they operate.

The featured technical speaker, John A. Mescher, core department, Unitcast Corp., Toledo, O., discussed "Core Blowing."

He discussed different types of core blowing machines, from the simple to the complex, pointed out the advantages and disadvantages of each and went on to name many advantages of core blowing over hand ramming. These include fast, economical operation and uniform core quality. Moreover, he said, core blowing can do jobs that hand ramming cannot. A whole core can be made at once without parting lines and does not require assembling and pasting. Mr. Mescher described the secrets of successful core blowing as cleanliness of equipment and the provision of adequate vents and blowholes.— *Jack C. Miske*

SOUTHERN CALIFORNIA Chapter of the AFS heard S. C. Massari, center, technical director of the AFS, speak at the first 1952-53 meeting, at Rodger Young Auditorium, Los Angeles. He was introduced by Hubert Chappie, National Supply Co., the program chairman, right. Chapter president Harold G. Pagenkopp, Angelus Pattern Works, at left

The 15th annual summer outing of Southern California Chapter of the AFS on Aug. 16 drew about 500 foundrymen and guests to Lakewood Country Club. The left view shows some of those who attended the dinner and variety show which climaxed the day's events. In view above are, from left to right, James Oliva, Frank Oliver, Anthony Tuzzolino and Amos Culp, who handled the food and beverages



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Small operators who retain no well developed plant engineering department and very large companies whose engineering departments employ hundreds of technicians—a cross section shows organizations of all sizes in all industries employing Giffels & Vallet, Inc., to aid them in developing new and modernized facilities.

An executive planning new developments may supplement his own engineering department for the specific occasion. He will conserve his own time as well as that of his key personnel through the use of our experienced engineers.

GIFFELS & VALLET, INC.

INDUSTRIAL ENGINEERING DIVISION
1000 MARQUETTE BUILDING, DETROIT

Theory of Hot Tearing

(*Continued from page* 133)

The various mold and geometry factors which determine the total amount of extension, developed during the critical time the metal is in the film stage, are the factors which must be controlled to prevent hot tearing.

That the metal does not hot tear during the mushy stage at temperatures considerably above the solidus is self evident from the appearance of hot tear fractures which show no sign of liquid flow. It has been assumed by various investigators that hot tears may form while the metal is semisolid but that the flow of liquid metal effectively heals the fracture. The strain theory predicts that hot tearing of semisolid metal (mushy) is not possible unless the strain rates are extraordinarily high. The elements of the basic considerations which underlie this prediction are illustrated schematically in Fig. 17.

While the metal is in the mushy condition which exists at temperatures considerably above the solidus, the extension of the hot zone is distributed relatively uniformly since the interdendritic liquid areas are relatively wide and general flow of the pasty mass results. As the hot zone approaches film stage the extension in the hot zone necessarily is forced into the narrow liquid films which have no appreciable strength compared to the adjoining solid dendrites. Fig. 17 illustrates the comparatively high value of unit strains developed in these regions at this time.

The width of the overall hot zone in a casting must be considered as a factor in determining if tearing will occur. If the hot zone is narrow and only a few films exist, each film must accommodate a great amount of extension; a wide hot zone will have many films and the extension per film will be less. If separation does not occur at the film stage of solidification, hot tearing is no longer possible because the strains in the hot spot area are distributed in a relatively uniform fashion through the coherent and ductile solid metal. Stresses will build up in the casting as cooling continues until the low yield point of the hot metal is exceeded, after which time creep flow occurs.

Theory Explains Mechanism

The strain theory serves to explain the mechanism of hot tearing without the need to consider complicated stress effects. Since the previous theories of hot tearing were based on stress or load bearing capacity, a discussion of stress factors is in order. It is apparent from a review of the literature relative to stress measurements that the loads developed at the time of hot tearing are of relatively low order (30-200 psi) if complete hot tearing of the test section is obtained. It is only under test conditions such that part of the casting is torn in a non-hot tear fashion that the loads rise to higher values.

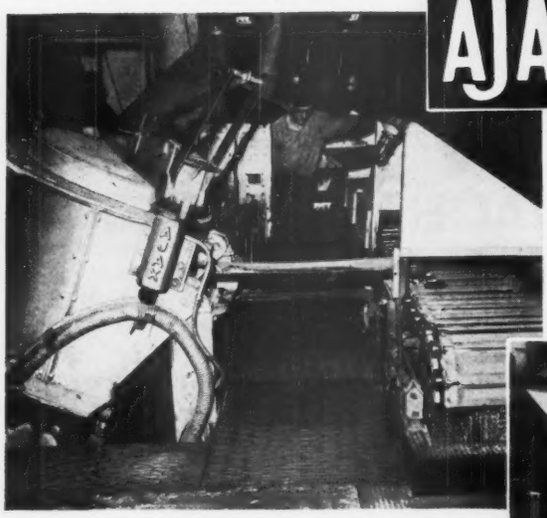
The test bar series of the Naval Research Laboratory investigation show quite clearly that the rise in load to values above 200 or 300 psi occurs only after a definitely solid skin has developed in the test section. It may be concluded that the specific loads required to develop hot tearing in casting are of relatively low order. It should be expected that the exact time during film stage that the strain reaches a critical value determines the level of stress required to develop the strain. This follows from the realization that film stage is not a

(*Continued on page* 194)

MILLIONS OF POUNDS

of Aluminum per year reclaimed with the help of

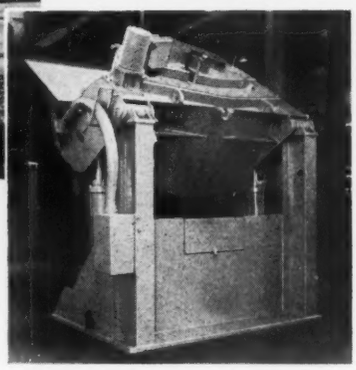
AJAX INDUCTION FURNACES



166 kW AJAX Induction Furnace in tilted position, pouring molten aluminum alloy through a coated trough into ingot molds on conveyor.

Major Auto Manufacturer recovers scrap from machining operation by modern melting process

Here is an interesting setup for reclaiming aluminum alloy chips, which is installed adjacent to the piston casting setup in one of the largest automobile manufacturing plants in the country. More than half of the aluminum needed for pistons in this plant comes from this scrap recovery program. A considerable net profit is realized, and aluminum purchases are lowered.



Above is a 330 kW furnace. AJAX Engineering Corporation manufactures low frequency electric induction furnaces in a great variety of sizes ranging from 20 to 1000 kW. This type of equipment has been adapted to the full range of nonferrous metals and alloys.

Send for Reprint of Article on Scrap Recovery by Induction Furnaces

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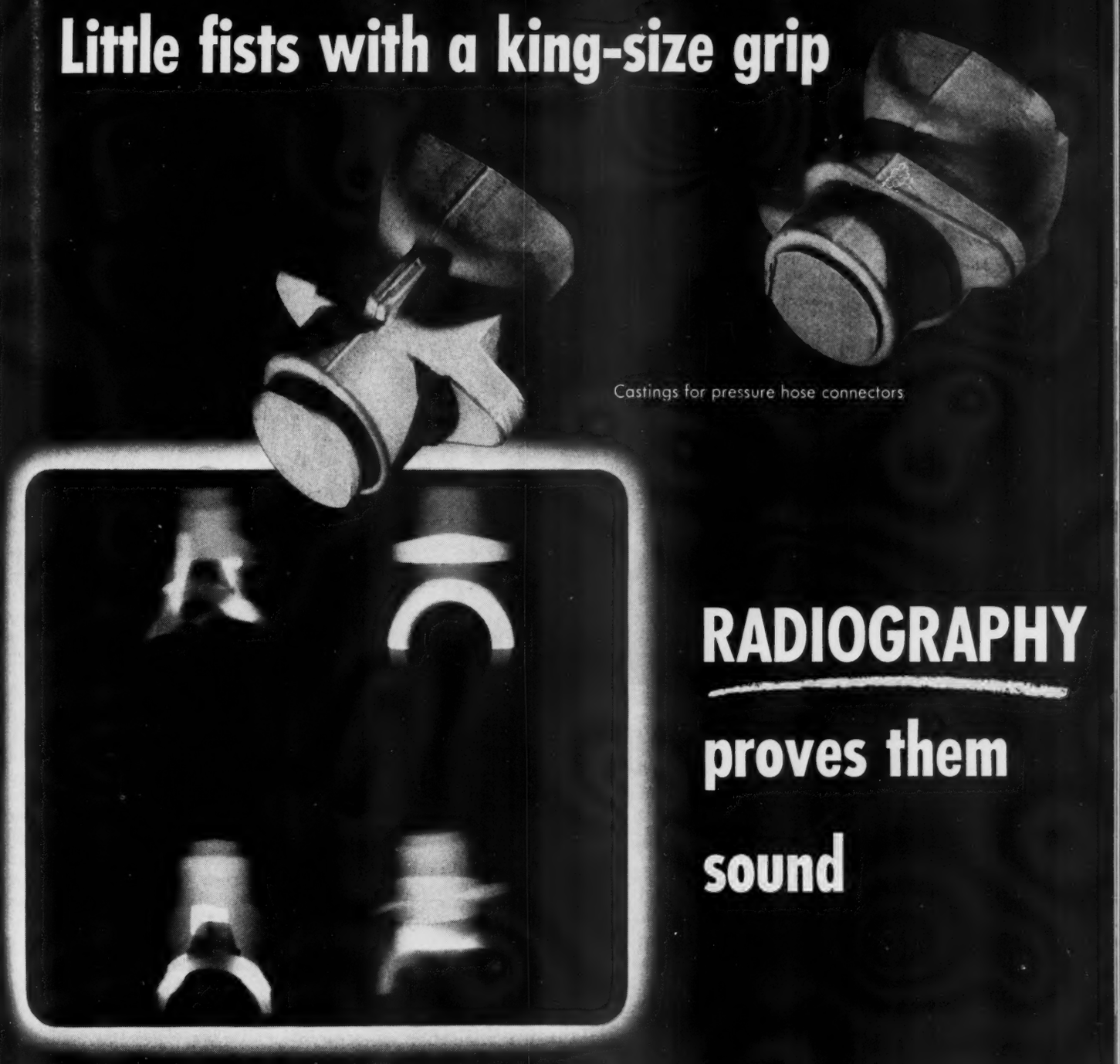
Little fists with a king-size grip



Castings for pressure hose connectors

RADIOGRAPHY proves them sound

The grip that these little metal fists get must not only hold fast but be pressure-tight. They're hose connectors with a vital job to do. Any possible cause for failure must be discovered—and before expensive machine time is wasted.

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(*Continued from page* 192)

fixed and specific condition but a condition which covers a range of film thicknesses.

As the metal first falls to a temperature which may be described as within the film stage, the films are relatively thick and completely continuous. At this time the load required to develop extension of the hot spot should be *near zero;* however, the extension required to develop fracture should be very high. As the metal approaches complete solidity the thickness and the continuity of the films decreases in regular fashion — accordingly, the value of load required to develop separation should increase; however, the critical extension required to develop fracture should be reduced greatly.

This effect was shown by Middleton and Protheroe[5], who observed that stiff springs used on their apparatus developed hot tears at slightly higher temperatures and at *considerably smaller* loads than the weaker, more flexible springs. Apparently, the hot spot was forced to absorb essentially all of the strain developed in the system when the stiff spring was used, resulting in accelerated straining sufficient to cause tearing at the higher temperature of "thicker" films and at lower load. Conversely, the weak springs absorbed a considerable fraction of the strain which was forced into the hot spot by the stiff spring system. Accordingly, a lower rate of strain was developed in the hot spot, with the consequence that tearing occurred at a lower temperature when the films reached a "thin" condition; at this point solid bridging (discontinuous film condition) also occurred, requiring higher loads for rupture.

The development of bridging as the lower temperature of the film stage range is reached is due to variations in composition and rate of solidification from spot to spot. This effect is illustrated by the partial tearing which is often observed, especially at the ends of the hot tear which approach the limits of the hot spot region. At these positions the tear is not continuous but is interrupted by metal which has held together in spots.

Regions Resist Hot Tearing

This effect was studied by cooling hot tear samples to very low temperature (dry ice) and then developing a brittle fracture in the regions which held together. It was apparent from these studies that isolated regions resisted hot tearing. The hot tear fracture shown in Fig. 4 shows several regions of "grain fracture" developed during the fracture of such an incomplete type of hot tear.

The increase in the temperature of hot tearing observed in the case of the aluminum alloys which contained shrinkage provides another case which is explainable by the strain theory. The development of shrinkage results in a concentration of strain due to notch effects; effectively the result is the same as if higher rates of strain were developed at the shrinkage position (note similarity to case of HAZ crack promoting weld hot tears). This provides the condition required to develop hot tearing at "thicker" films stage, hence higher temperature. Once the hot tear is started at the shrink area (notch), propagation is easily provided by the film path. Thus, shrinkage should be expected to promote the development of hot tears which may not have occurred in the absence of strain concentration.

General Discussion — The various observations of the interrelated effects

(*Continued on page* 196)

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(*Continued from page* 194)

of metal and mechanical variables lead to a generalization of the hot tearing problem to the following principal elements:

1. The time-rate of extension of the hot zone during its film stage is the primary mechanical factor which determines hot tearing. Inasmuch as the film condition stage lasts for only a relatively short fraction of the total solidification time, hot tearing will occur only if a sufficient rate of extension is forced on the film regions during this short time.

2. The rate of extension forced into the film regions is related to: (a) the overall extent of the hot zone, (b) the amount of mold restraint, and (c) the length and rapidity with which the adjoining sections cool relative to the hot zone.

3. The presence of elements such as sulphur extends the film condition to lower temperatures and therefore increases the duration of the film stage.

4. The longer the interval of film stage, due either to segregates or to slow cooling, the greater the total amount of separation developed in the films. Thus, increasing the duration of the film stage permits hot tearing to result with lower time-rates of extension than would cause hot tearing in the absence of film forming elements.

5. The presence of sulphur and phosphorus not only causes hot tearing to occur with milder mechanical conditions but also causes enlargement and aggravation of tears which begin at the normal higher temperatures in the presence of severe mechanical conditions. The wider temperature range of hot tearing provided by these elements permits enlargement of the initial cracks in true hot tear fashion. Thus, as is normally observed, film forming elements produce *more numerous* and also *more severe* hot tears.

Alloys Affect Hot Tearing

Composition of the metal should be expected to affect hot tearing in direct relation to the tendency of the metal to develop more extensive and longer-existing liquid films. In general, this means that alloys which have wide solidification temperature range and high conductivity should be most prone to hot tearing. This follows from the fact that these two metal characteristics act concomittantly to produce "mush" freezing; i.e., freezing such that dendrite islands surrounded by liquid regions are developed. The interrelation of metal characteristics which control the mode of freezing has been discussed in detail in a generalized report on the solidification of metals[3]. It was shown in this report that the freezing mode of carbon steels is not greatly affected by variations of carbon level in the range of .20-.60 per cent. It is indicated accordingly that the differences in susceptibility to hot tearing of such steels should be of minor order.

It is possible to show apparently strong carbon effects by the use of specialized castings; however, the effects are specific to the casting itself and should not be deemed general to all forms of castings. These statements also apply to the case of pouring temperature studies utilizing specific types of test castings.

In these respects it is most interesting to review the extensive literature of such studies and not the *reversal* of effects obtained by the various investigators. There is no doubt that if strong one-way effects of carbon content and pouring temperature did, in fact, exist, the foundry field would have been cognizant

(*Concluded on page* 199)

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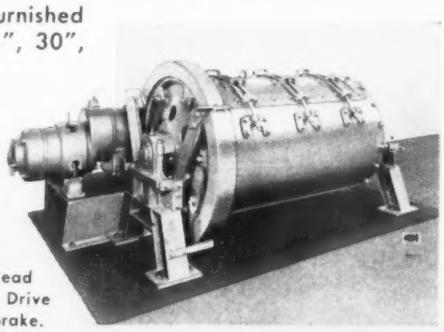

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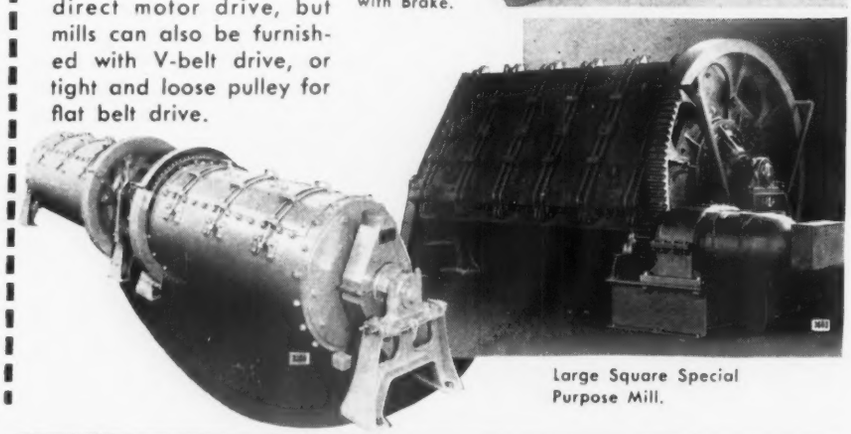

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(*Concluded from page* 196)

of such. Instead, any hot tear discussion meeting of steel foundrymen will find the group divided in distinctly opposite opinions regarding carbon and pouring temperature effects, depending on the general types of castings produced and the foundry practices used by the individuals expressing the opinions.

That variations in the types of castings and in the specific practices of gating, risering, etc. should cause apparent reversals of hot tearing effects, is predicted from simple consideration of the variety of possibile effects from pouring temperature and metal variables, on the nature and extent of hot spot and contraction conditions in castings of different types.

Causes Are Mechanical

With the exception of segregates (sulphur, etc.), which may be termed "metal problems," the causes of hot tearing which are subject to practical control are almost entirely of a *mechanical* nature. Thus, the feeling of many foundrymen that hot tearing is a question related 5 per cent to the metal and 95 per cent to the mold, gating, risering, etc., is fully justified. Given the proper mechanical conditions, every cubic inch of steel, irrespective of its carbon content or pouring temperature, could have been made to hot tear.

It is important that foundrymen realize that the tendency to hot tearing is a fundamental property of metals at film stage. It would be well to borrow from the brazing field and regard castings as going through a "tender" stage. Thus, the development of hot tearing would not be considered as representing a case of perversity on the part of the metal but of disregard of the "tenderness" of the casting during a brief but all-important period of its solidification life. Such a change of philosophy would do much to increase attention to necessary molding and casting design details, resulting in a decrease in the frequency of hot tears and in a considerably more pleasant life for furnace operators, often blamed for producing "hot tearing" metal.

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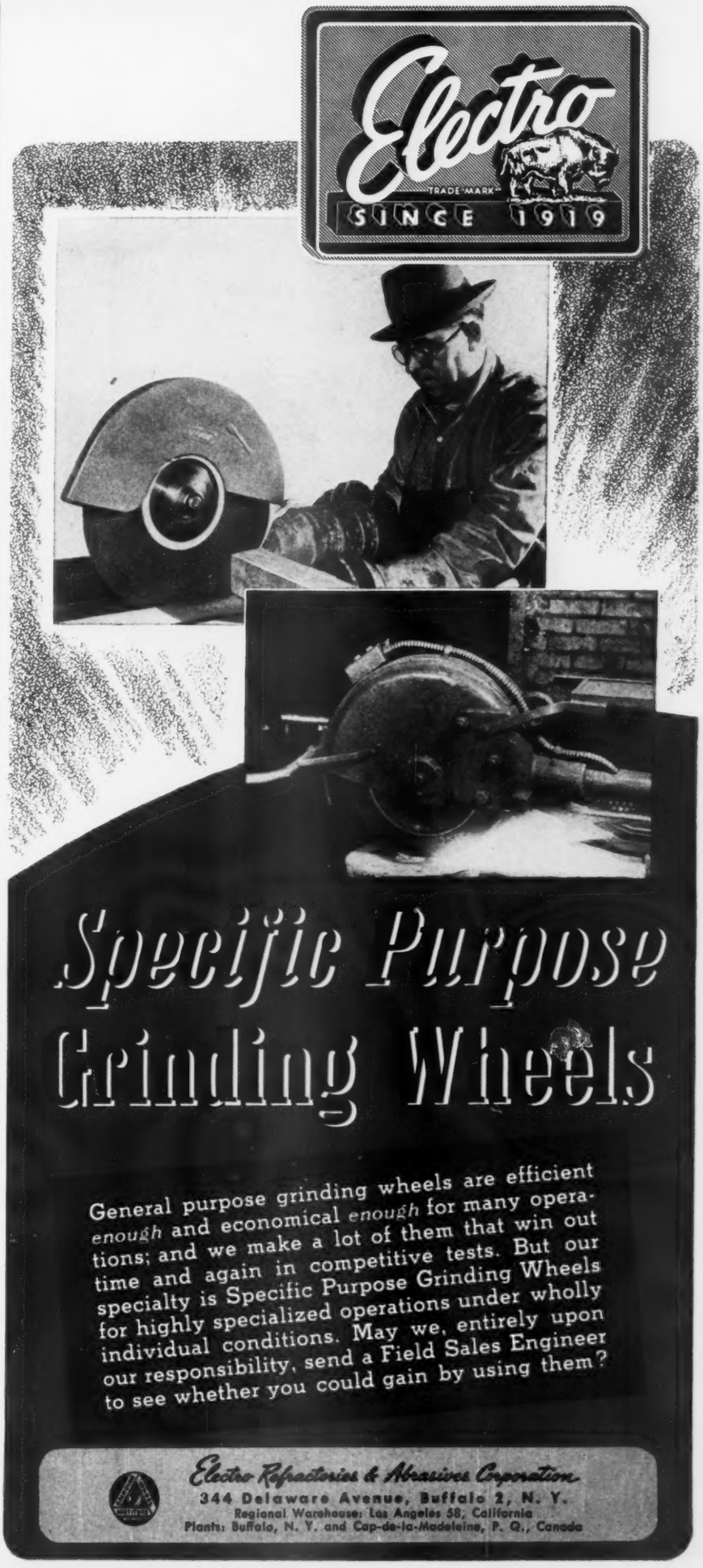
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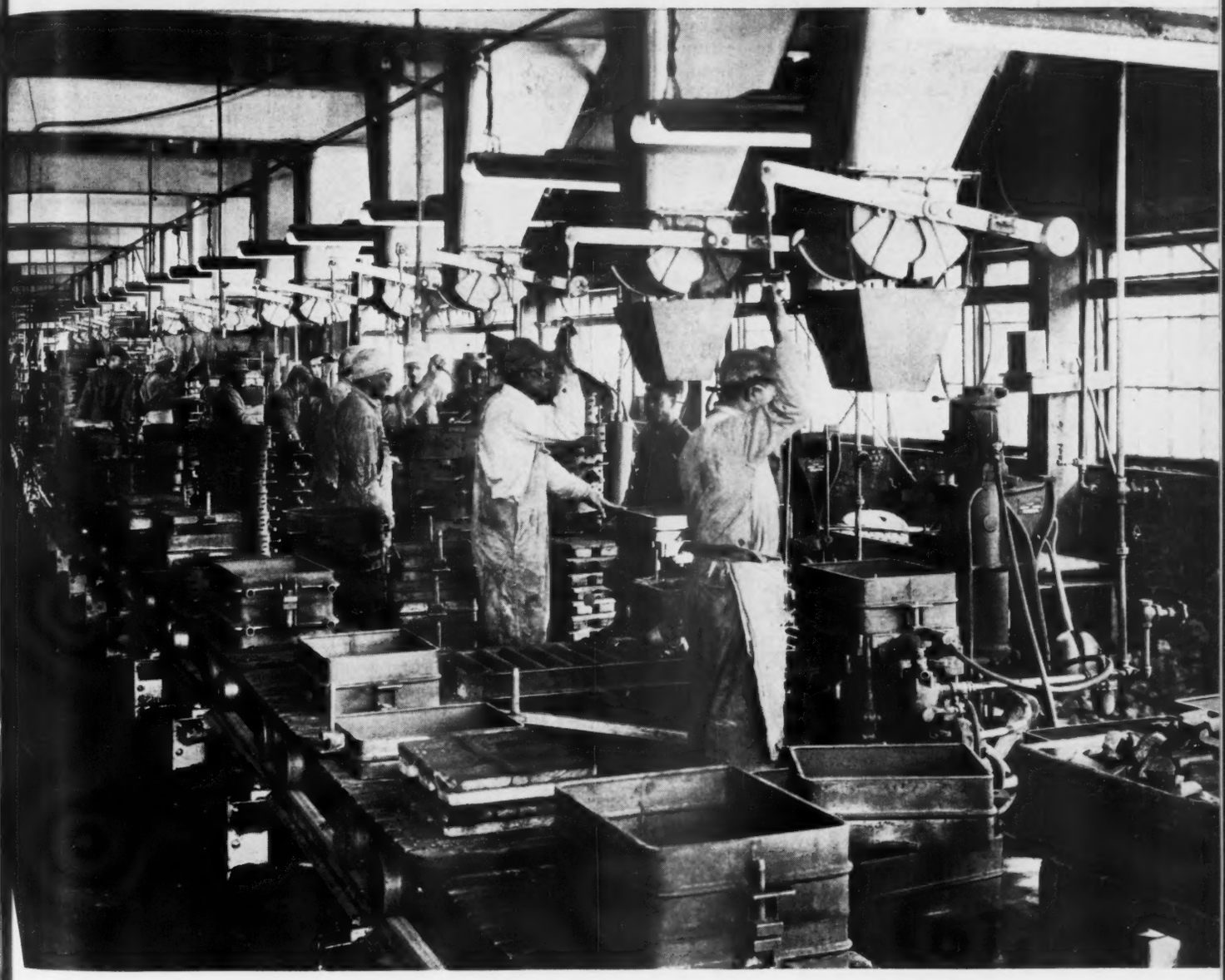

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OBITUARY

GEORGE E. M. BEAN, 66, managing director of the Wilmington, Del., branch of the Eastern Malleable Iron Co., Naugatuck, Conn., died suddenly Oct. 6. Mr. Bean attended Baltimore City College, began his engineering studies at Virginia Polytechnic Institute and attended the University of Michigan. In 1905 he started his foundry career with T. H. Symington & Co., Corning, N. Y., where his brother, Wyndham R. Bean, who now resides near Staunton, Va., was superintendent. Mr. Bean continued in the employ of that company when the plant was moved to Rochester, N. Y., in 1909. Four years later he became connected with the Zanesville Malleable Iron Co., Zanesville, O., and a short time later joined the Walter A. Wood Co., Hoosick Falls, N. Y. He first became connected with the Eastern Malleable Iron Co. in 1917 when he was made assistant plant manager at its New Britain, Conn., plant. He became head of the Wilmington plant in 1939. In 1947 Mr. Bean was chosen as first recipient of the Malleable Founders' Society's Charles H. McCrea medal. The award was based on his work as

GEORGE E. M. BEAN

chairman of the society's committee which produced the handbook, *American Malleable Iron.*

* * *

Edward B. Sherwin, 63, since 1935 president, Chicago Hardware Foundry Co., North Chicago, Ill., died Oct. 10. Mr. Sherwin joined the company, founded by his father, following graduation from Illinois Institute of Technology in 1910. He was a director of McCarthy Foundry Co. Inc., Chicago, and of Illinois Manufacturers' Association. Mr. Sherwin was treas-

EDWARD B. SHERWIN

urer of the National Foundry Association, former treasurer of the Gray Iron Research Institute and an officer and director for many years of Gray Iron Founders' Society, serving on its first governing board.

* * *

James W. Tovell, 69, one of the founders and former president, Cleveland Aluminum Casting Co., Cleveland, died Oct. 3. Mr. Tovell was born in Guelph, Ont., and went to Cleveland in 1906. In 1914 the Cleveland Aluminum Casting Co. was or-

(*Concluded on page* 204)

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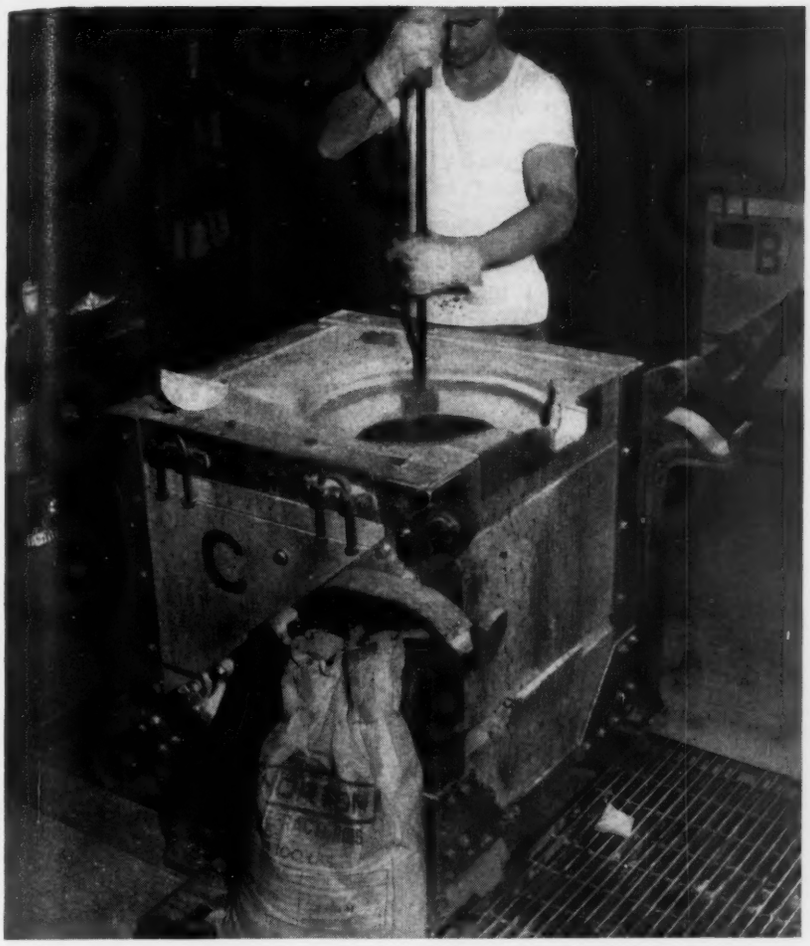
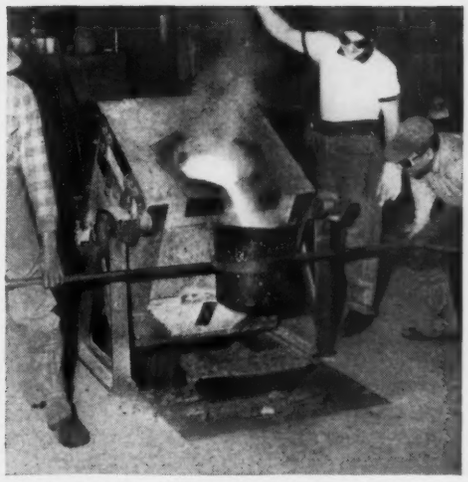
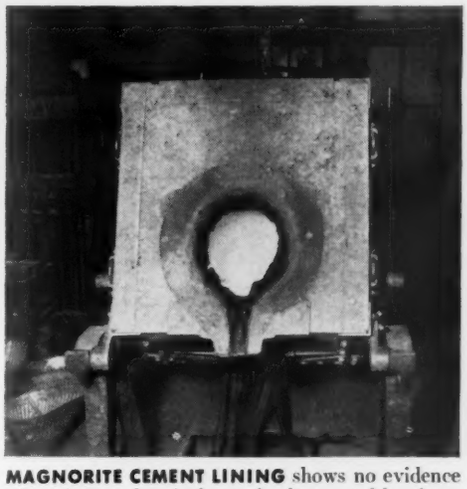


RAMMING Norton MAGNORITE cement lining into an Ajax 500-lb. high frequency induction furnace. This cement has been developed specifically to be dry rammed and will withstand temperatures up to 3250 F. It provides densest possible lining for resistance to metal penetration and erosion.



MOLTEN STEEL is here poured into ladles. Due to the employment of fractional tapping, cement lining must withstand much longer periods of holding melt at pouring temperatures. Highly refractory Norton MAGNORITE cement insures long life and low maintenance cost even under these conditions.



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You'll get long life, low maintenance cost from your furnace linings by using Norton refractory cements. *You'll melt more metal per lining.*

These cements are available in a variety of refractory compositions designed to meet your individual needs. *Norton MAGNORITE* cement*, for instance, is used in high frequency furnaces for a wide variety of melts, ranging from straight steels to heat-resistant compositions. *Norton FUSED STABILIZED ZIRCONIA* crucibles are excellent for melting platinum and its alloys. This sensational refractory is not wetted by the metal, permitting 100% recovery of the melt without destroying the crucible. *Norton ALUNDUM* and MAGNORITE* crocks, covers, and cements are used successfully in indirect arc furnaces. These cements are also used in low frequency furnaces for melting such refractory alloys as cupro-nickel and nickel silver; high copper alloys and Al, Te, and Si bronzes. *ALUNDUM* cement is also excellent for handling stainless steel.

For heat-treating and sintering furnaces investigate ALUNDUM and CRYSTOLON* hearth plates, pier brick, burner blocks, muffles, muffle plates, skid rails, recuperator tubes, burner-tunnel, and embedding cements.

Whatever your problem, you can depend on satisfactory solution when Norton research engineers Norton refractories to fit your exact requirements. For further information, see your nearby Norton representative — or write direct to NORTON COMPANY, 309 New Bond Street, Worcester 6, Mass. *Canadian Representative:* A. P. Green Fire Brick Co., Ltd., Toronto, Ontario.

*Trade-Marks Reg. U. S. Pat. Off. and Foreign Countries

NORTON

Special REFRACTORIES

Making better products to make other products better

NORTON COMPANY, WORCESTER 6, MASSACHUSETTS

(*Concluded from page 202*)

ganized and he served as president and general manager until his retirement in 1945.

* * *

Thomas D. Potts, 56, executive vice president, Adirondack Foundries & Steel Inc., Watervliet, N. Y., died Sept. 24. Mr. Potts had been with the company since it was organized in 1920.

* * *

George M. Benkert, 80, founder and president, Fairmont Foundry Inc., Philadelphia, died Aug. 31.

Homer A. Steinbrink, 61, recently associated with Memphis Casting Works Inc., Memphis, Tenn., died Sept. 12. Mr. Steinbrink was formerly general manager, Century Foundry, division of Century Electric Co., St. Louis, which he joined in 1945.

* * *

Chester P. Guion, 59, sales engineer in Indiana and Central Illinois for National Engineering Co., Chicago, and W. W. Sly Mfg. Co., Cleveland, died Aug. 31 following an automobile accident.

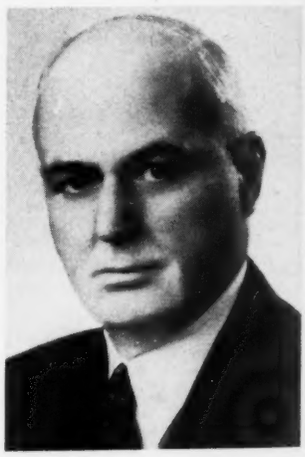
Roy C. Scherbarth, 47, chief engineer, Milwaukee Chaplet & Mfg. Co., Milwaukee, died Aug. 27. Mr. Scherbarth joined Milwaukee Chaplet & Mfg. Co. in 1942 as chief engineer, and from 1944 to 1950 was also chief engineer of its Rice Pump & Machine Co. division.

* * *

Maurice G. Klemme, 64, president and treasurer, Eagle Foundry Co., Belleville, Ill., died there Sept. 11. The Eagle Foundry was established in 1883 by Mr. Klemme's father, Gottlieb D. Klemme, and a group of Belleville residents.

* * *

Thomas G. Johnston, 65, metallurgical engineer with the pig iron and coal chemicals division of Republic Steel Corp., Cleveland, died there unexpectedly, Oct. 10. Born in Ironton, O., Mr. Johnston joined the U. S.



THOMAS G. JOHNSTON

Pipe & Foundry Co., Bessemer, Ala., in 1905. He was superintendent of the plant in 1936 when he left to join Republic. Mr. Johnston served on the Technical Committee on Pig Iron and Ferroalloys of the American Iron and Steel Institute.

* * *

Raymond Harsch, 60, part owner and superintendent of the pattern department, John Harsch Bronze & Foundry Co., Cleveland, died Sept. 27.

* * *

George W. Pyott, 78, former head of the Pyott Foundry & Machine Co., Chicago, died Sept. 30 in Neenah, Wis. Mr. Pyott retired in 1929.

* * *

Herbert G. Dyktor, 60, since 1947 commissioner of air pollution control, Cleveland, died Oct. 4.

* * *

John H. Wellman, 40, secretary and purchasing agent, Wellman Bronze & Aluminum Co., Cleveland, died Oct. 6.

"Check every heat!"

Measuring the temperature of every heat with Marshall Thermocouples gives the foundryman proper control of his pouring temperatures!

He thereby generally eliminates porosity, excessive shrinkage, cold shuts, and the quality of his castings is standardized.

These Marshall Enclosed-Tip Thermocouples check the temperatures of molten brass, bronze, aluminum and magnesium. They operate quickly and dependably. Their use is one of the foundryman's best aids to better castings. L. H. Marshall Co., 270 W. Lane Ave., Columbus 2, Ohio.

Tips are protected so circuit is unhindered by action of the dross or slag.

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THERMOCOUPLES

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"PLANER"

. . . about pattern quality

City Pattern Foundry & Machine Company's Shrinkage Conversion Tables save time and eliminate errors in shrinkage calculations. Your letterhead request will bring a set of these handy tables without obligation.

The planer shown above is an important factor in making City Pattern Foundry and Machine Company a reliable source for metal patterns. In excellent condition, manned by a skilled operator, it starts off large patterns on an accurate foot toward later operations. Its capacity and modern design assure you of that accuracy at lowest cost.

In itself, a planer does not constitute a pattern shop . . . but as typical of the unusual equipment on our working team, it assures you of the facilities to make the finest patterns accurately and economically. And this is the very reason leading manufacturers have relied on City Pattern Foundry and Machine Company for almost forty years.

Setting the Pattern in Patterns

CITY PATTERN

FOUNDRY AND MACHINE CO.

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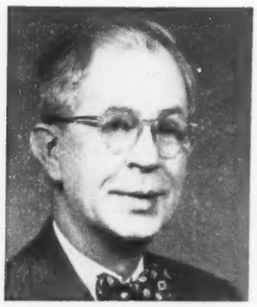
MAN-TO-MAN

on the Molder's Bench

"Organization Personalities"

By RALPH L. LEE



I IMAGINE that almost anyone who gets around as much as I do is bound to notice the difference in the feeling that comes over him as he goes into one place of business after another—although I expect some people are more sensitive to these feelings than others.

I don't know of anyone who visits as many organizations as I do in my many travels. As a result, I have become so sensitive to what I call the personality of an organization or a group I can feel it the minute I walk through the front door. Sometimes the feeling's so strong it seems to come out to meet me even before I get to the front door, like the smell of baking bread from a bakery or cores from a foundry.

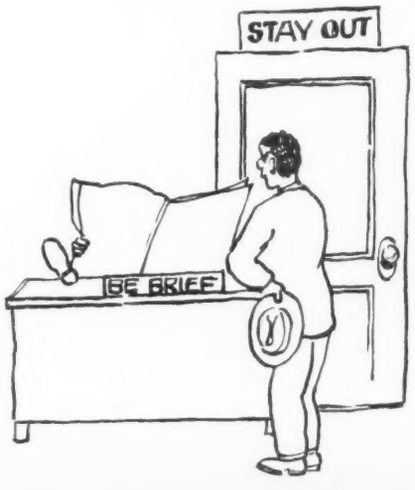
Sometimes I get clear through the front door and up to the window or desk before the receptionist, either male or female, full or part time, looks up from his cross-word puzzle with a look on his face that says as plain as words, "I know darned well that you've got the wrong place and you would make your mistake on my busy day." Then he talks into the phone about me out of the side of his mouth, so low I can't hear what he's saying, and looks downright hurt when he finds that I was invited. He tells me where to go—and in just that tone of voice.

The brass I came to see, after one long wait hands me a cold clammy mit and from the dead fish-eye look in his eye I know he is telling one big fib when he says, "Glad to see ya."

When I get out into the shop everyone I see seems to be carrying a chip on his shoulder and just daring someone to knock it off. They look at me that way even though they never saw me before. I see waves of loafers gathering in the wake of the bosses as they strut through. I keep looking at my watch to see if it has stopped, longing for the instant when I will be released from this prison of suspicion, mistrust and doubt.

But, thank the Lord, I get another feeling when I walk into another kind of a plant. The receptionist, who, never having taken up cross-word puzzles, sees me coming before I get to the front door, and he greets me as though he is used to having something good come from the people he greets. He isn't the least bit surprised when he finds over the phone that I was invited, and he tells me where to go, but not in that tone of voice; in fact he takes me or gets someone else to do it for him.

I know the man I came to see means it, when he grabs my hand and says, "We've been expecting you and are glad you came." He can hardly wait to say, "Boy! get your hat and come with me, you're going to see one of the go-gettin'est gangs you've ever seen in your life." And he turns out to be right, for every place I look in the shop everyone seems to have a spring to his step and a look on his face that says as plain as words that he's anxious to get where he's going to do something he wants to do when he gets there. He greets everyone else as though he expected them to be in exactly the same boat; even me.



The hands of my watch whiz around like crazy and I hate the thought of leaving, for I have had such a good time, learned so much and felt even more.

Between these extremes I get feelings of every shade and kind, ranging from that of not being wanted, of being dared to prove worth-while, being tolerated, being ignored, being resented on up the scale to sincere welcome, appreciation and fellowship.

Now if this feeling business was just an item of passing interest along the way, like the color of leaves in the fall or the shapes of clouds in a storm, I don't believe I'd be writing about it at all. But I have noticed that the business batting average of places I visit seems to be inseparably linked up with the feelings I get while visiting them. The places I feel like getting out of as quickly as I can invariably are at the bottom of the list by every business measure, and those I hate to leave are way out in front and going to town.

Many years ago when I first noticed and then checked this connection I made up my mind to find out if I could why it existed and the reason for this wide variation in organization personalities. Now I believe I've got the suspect cornered.

Every trail has led to the opinion or belief of the leaders of an outfit as to *what side their bread is buttered on.*

If the leaders of an organization, a group or a department of a group believe down in their hearts that they are the ones who are really doing the overall job, even though conditions force them to hire hands to carry out their orders, then a feeling of rebellion at the role of servant to master will take hold and spread throughout the group until every mother's son in it becomes inoculated with the feeling of doing no more or no better than he can get out of doing.

On the other hand, if the leaders of an organization or a department know for a fact what side their bread is really buttered on they will realize that their success is like a jig-saw puzzle, with each and every piece necessary to the whole in the hands of every individual in the group, from

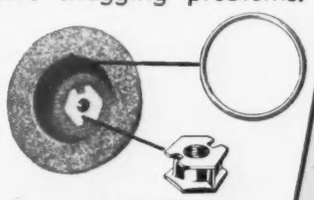
(*Concluded on page* 208)

. . . but you can get PEAK PERFORMANCE with BAY STATE SNAGGING WHEELS!

Conscientious, skilled craftsmanship . . . Modern Manufacturing Equipment . . . Research Facilities . . . Personnel with Extensive Engineering Background . . . Exclusive Manufacturing Features . . . these factors all contribute to BAY STATE'S continued success in recommending proper grits, grades and bonds that completely solve snagging problems.

BAY STATE ®

EXTRA SAFETY FACTOR from Bay State's patented process that secures the steel nut to the wheel. Steel ring imbedded for additional safety, as needed.



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ASK for a BAY STATE abrasive engineer to prove a new peak of performance on your job today!

(*Concluded from page* 206)

the lowliest sweeper-outer to the indispensable experts, to either make or break for them.

With the leaders of such a group knowing these facts and dealing with each other and with their followers according to these facts, then a feeling will take hold and spread until everyone in the outfit will take pride in holding up his particular and personal end with the feeling of letting himself go to do the best he knows how to do and is able to do.

I am convinced that either of these kinds of feelings is so powerful and so contagious that it will spread and take hold of an organization regardless of the most ingenious employee relations programs, plans, devices, rewards and even pay itself.

I guess when we get right down to it the margin of performance which spells the difference between flat failure, mediocrity or leadership will be found in the sum of that difference between the little each individual can't get out of doing and what he could do if he felt like doing it. It looks as though this feeling business is more than an interesting side issue in the running of a business. It might well be the valve which either releases or withholds the extra performance required for the outstanding success of either the leaders of an organization or each of the individuals in it.

I wish I were as sure of everything as I am of the fact that most of the worth-while things people do are done because they *feel* like doing them, not because they *think* they should. In my opinion this productive feeling cannot be put into effect like a new work schedule, nor sprayed onto an organization with any hope of having it penetrate. It's a long haul process, it's got to grow from the seeds of examples set by the leaders. But boy! once it takes root nothing can stop it from spreading all over the place.

Want core plates that SAVE MONEY?

. . . then use TRANSITE CORE PLATES for easy handling, low maintenance, long life!

You get real long term economy with Transite* Core Plates. Their initial cost is low . . . and their maintenance cost negligible. Transite Core Plates are tough and corrosion-resistant. They are made from an asbestos and cement composition by a special Johns-Manville process. They resist shock and corrosion . . . will not crack or break easily.

Here are other important reasons for using Transite Core Plates:

THEY SPEED PRODUCTION— Transite Core Plates are easily handled. They're simple to clean, too, since core wash, sand, etc. do not adhere to them as readily as to other core plate materials.

THEY MAINTAIN ACCURACY— Foundrymen who have used Transite Core Plates for years report minimum warpage.

For cores of large mass and small surface area, perforated Transite Core Plates are also available to eliminate green cores and reduce baking time. For full details, write Johns-Manville, Box 60, New York 16, New York.

*Reg. U. S. Pat. Off.

Johns-Manville TRANSITE CORE PLATES
Made of Asbestos

Fred G. Kramer Sponsors Scholarship Fund

Fred G. Kramer, sales engineer and technical adviser, American Silica Sand Co., Ottawa, Ill., has established the "Fred G. Kramer Graduate Scholarship Fund" at Ohio State University. Provided to enable students to obtain a better background of fundamental knowledge of the physical sciences than usually is possible at the undergraduate level, this scholarship fund is open to persons who wish to do graduate work in the foundry field.

Interested persons should communicate with Dr. Douglas C. Williams, Department of Industrial Engineering, Ohio State University, Columbus, O., for particulars.

Reynolds Adds Capacity

Pig aluminum capacity of Reynolds Metal Co.'s installation at Longview, Wash., has been increased from 60 to 100 million pounds per year. The increased production was achieved by enlargement of the Longview plant's 372 reduction "pots," the electrolytic cells where alumina becomes metallic aluminum.

The pot structures were trucked individually to a Swan Island, Wash., firm which rebuilt them by cutting them in two and welding in new sections, thus in effect stretching the pots to greater capacity. After the expansion operation, they were returned to Longview and installed in the original buildings.

During the expansion program, which began in February, 1952, production was maintained at all times at more than 50 per cent of original capacity. Cost of the increased capacity is approximately $7 million.

HANDLES EVERY MATERIAL—*FASTER*

shorter turns . . . no gears to shift . . . easier steering . . . faster travel

the New BUTLER 203 *CARSCOOP*

12 CUBIC FOOT BUCKET (AT WATER LEVEL)

360° OPERATOR VISIBILITY WITH BUCKET IN CARRYING AND DUMPING POSITION

NO GEARS TO SHIFT. SIMPLY PUSH ON FOOT LEVER FOR FORWARD AND REVERSE

SPLIT-SECOND SHIFT

REVERSE

FORWARD

PNEUMATIC FRONT TIRES. ALSO DESIGNED FOR SOLIDS. TWO SOLID STEERING TIRES

HIGH STEEL SEAT BACK PROTECTS OPERATOR. FITTED BACK RESTS AND SPONGE RUBBER SEAT FOR COMFORT

Agile as a cat — the NEW BUTLER 203 Carscoop — always the world's fastest boxcar unloader — today is even faster, turns shorter and carries a bigger load. In short, the BUTLER 203 offers a larger slash in your material handling costs.

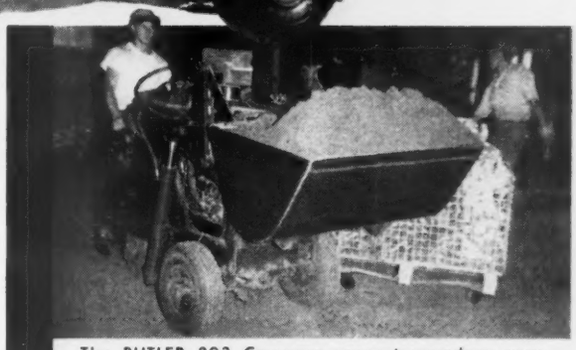
The 203 Carscoop is like an extra pay check in general platform and factory floor work. But the dividends really pour in where you have very "tight quarter" operation. Boxcar unloading the BUTLER 203 handles as if it was born for it — which it was!

The big 12 cubic foot bucket nets a lot of material per trip; faster forward and reverse speeds *plus* faster, shorter turns means more trips per day.

Balanced steering, literally finger tip — even when the 203 is standing still, is a joy to the operator, actually encourages him to set new records.

And let's not forget that high steel seat back. Not only comfort but a big protection when floor traffic is heavy. Write us for the new 203 BUTLER Carscoop Bulletin. Just a postcard will get immediate attention. Write today!

Sales Agents in all Principal Cities and Free Countries



The BUTLER 203 Carscoop saves tremendous manpower in foundry materials handling.

The BUTLER 203 Carscoop can pile it high.

Literally darts in and out of boxcars.

BUTLER BIN CO.-CARSCOOP DIVISION- 937 Blackstone Ave. Waukesha, Wis.

FIFTH OHIO REGIONAL CONFERENCE

Held at Ohio State University

By WILLIAM G. GUDE, ROBERT H. HERRMANN and JACK C. MISKE
FOUNDRY

FIRST of the season's series of regional foundry conferences was sponsored by Central Ohio Chapter of the AFS at Ohio State University, Columbus, O., Sept. 26-27, with the co-operation of the university and the Northeastern Ohio, Canton District, Cincinnati, Toledo and OSU Student Branch chapters.

Sectional meetings on gray iron, steel, nonferrous metals and malleable iron, plus three general sessions, two luncheons and a banquet, constituted the program under the general conference chairmanship of Dr. Douglas C. Williams, industrial engineering department, Ohio State.

Dr. Williams presided at the opening general session at which participants were welcomed by William T. Bland, Commercial Steel Castings Co., Marion, O., immediate past chairman of Central Ohio Chapter. Kenyon S. Campbell, field director, Ohio State University Development Fund, spoke briefly of the co-operation between the university and industry, pointing to the university's research facilities and its program of high level foundry education.

How To Avoid Friction

Principal speaker was Maj. Charles T. Estes, special assistant, Federal Mediation and Conciliation Service, Washington. Under the subject "The Boss and You—How Do You Get Together," he emphasized the need of proper communication between people, especially between supervisors and workers in industry, if friction in human relations is to be avoided. To achieve that he suggested the indirect approach in getting a suggestion or an order across to another person. Make the person want to do something; don't try to force him to do it.

He went on to say that supervisors should be educators and mediators. They should be adept at communicating orders and ideas; they must be good leaders. Such is not always the case, according to Major Estes. In citing an example, he stated that, too often, foremen are chosen from the ranks more for their skill as craftsmen than for their ability to lead men successfully.

At the Friday luncheon, Chairman Eldon Boner, Cooper-Bessemer Corp., Mt. Vernon, O., introduced Dr. Richard Anderson, Battelle Memorial Institute, Columbus, O., to discuss Alaska. In a predominantly humorous vein, Dr. Anderson explained why he thought Alaska should not be granted statehood at this time. His principal contention was that Alaska's 128,000 inhabitants, as of the 1950 census, could not discharge the obligations statehood imposes since the territory in which they live is twice as large as Texas.

The banquet was held at the Deshler-Wallick Hotel with Dr. Williams presiding. I. R. Wagner, Electric Steel Castings Co., Indianapolis, national AFS president, spoke briefly, conveying greetings from the national office. "Problems in Our Atomic Age" was the subject of the main address by Dr. Alfred B. Garrett, department of chemistry, Ohio State. The speaker listed major problems which must be solved for peaceful human progress as: Unrestricted concentration of atomic fuels, unbalanced population, maldistribution of natural resources, opposite philosophies of government, and living in a fast-moving world of scientific progress.

Gen. William T. Hefley, assistant deputy commanding general, Air Materiel Command, Wright-Patterson Air Force Base, Dayton, O., spoke at the Saturday luncheon, concluding the conference. His topic was "Industrial Mobilization."

General Hefley described defense-building plans of the Air Force and stated that the foundry industry is basic and essential to the program. From a military point of view the industry has two natural advantages: It possesses the flexibility necessary for quickly assembling equipment to produce parts, making it easily convertible from civilian to armament production. Secondly, it is a decentralized industry.

The speaker mentioned a Wright-Patterson Air Force Base project known as "Casting Potentials" which studies possible uses of castings because of Air Force acknowledgment that casting methods are the cheapest roads to completed parts.

Gerald J. Grott, research metallurgist, Unitcast Corp., Toledo, O., spoke on "Metal Removal" at the first meeting of the general session. He was introduced by Chairman David C. Ekey, Department of Industrial Engineering, Pennsylvania State College. Mr. Grott noted that although the foundry industry has been passing from an art to a science for a good many years, published measurements on metal removal are almost wholly lacking. Stating that methods of cutting should be measured for efficiency and economy, he described experiments performed at his company for that purpose.

These experiments concerned the correlation of power input and grain and bond of grinding wheels with properties of metals, the determination of the most economical fuel to use in flame-cutting preheating, the importance of the shape of risers and similar factors. As a result of these experiments, he feels that some engineering units can and should be used to standardize designations of grinding wheels according to performance.

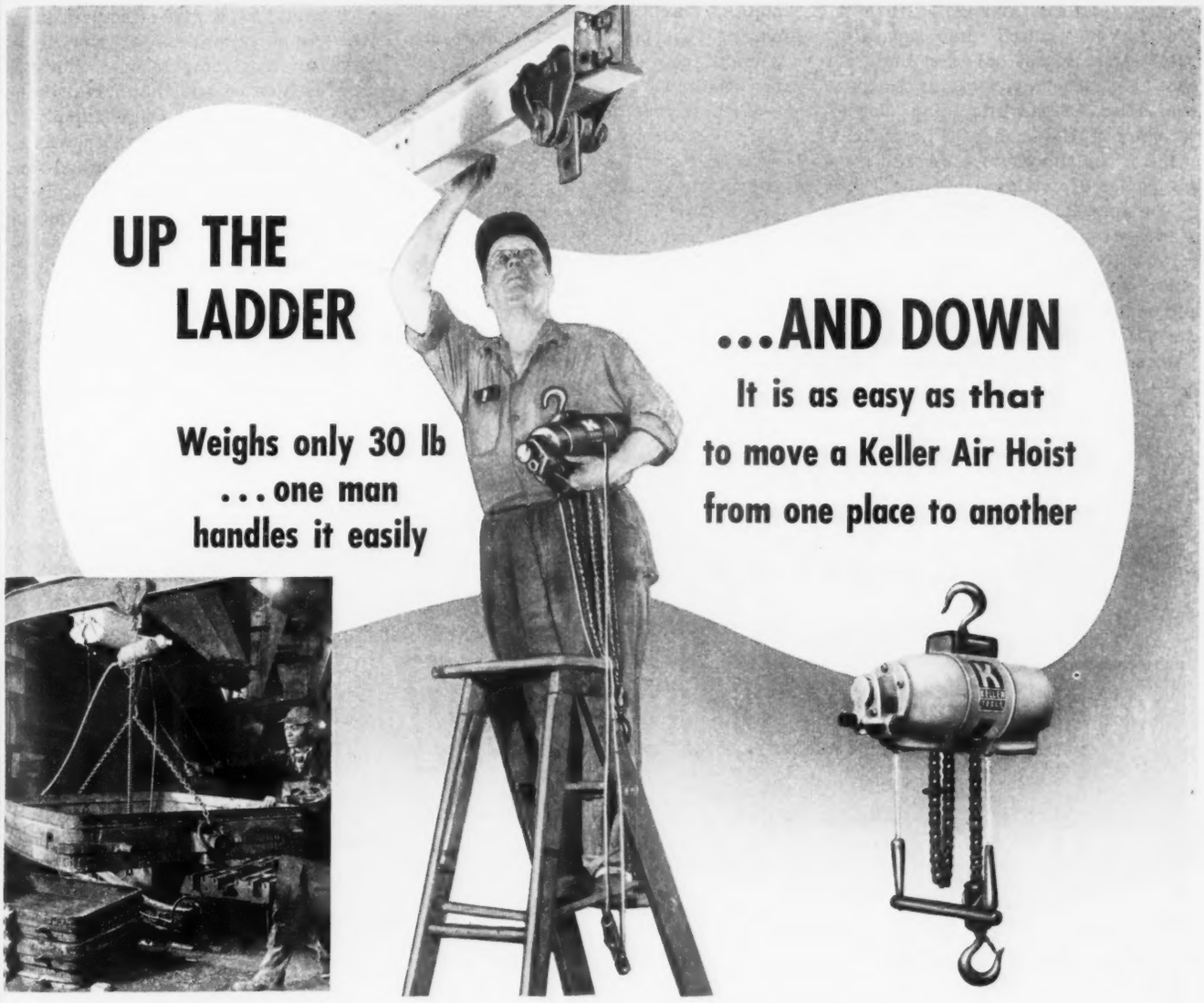
Causes of Gas Formation

His work also indicated that acetylene is the most economical fuel for preheating in flamecutting operations and that for some rectangular risers, the length of cut is less than that required for round risers of equal area.

The concluding general session comprised a detailed discussion of "Gases in Metal" by Dr. C. E. Sims, Battelle Memorial Institute, Columbus. Dr. J. W. Spretnak, Ohio State, was chairman. The speaker described some of the causes of gas formation—principally hydrogen bubbles—in molten metal and methods of correcting the condition. The latter include the carbon boil in steelmaking furnaces, and the bubbling of inert gas through nonferrous metals to remove hydrogen gas. Speaking of gas causes, Dr. Sims pointed out that an improperly dried mold may cause more trouble than a more permeable green sand mold.

Two sessions on nonferrous metals were held Saturday morning under the chairmanship of W. J. Klayer, Aluminum Industries Inc., Cincinnati, O. At the first, Don LaVelle, Federated Metals Division, American Smelting & Refining Co., New York, discussed "Aluminum Alloy Test Bars —Their Meaning and Production."

(*Continued on page* 212)



UP THE LADDER

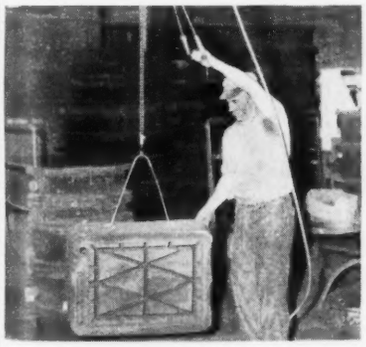
Weighs only 30 lb ... one man handles it easily

...AND DOWN

It is as easy as that to move a Keller Air Hoist from one place to another

ABOVE: *Moving side section of a large flask.*

BELOW: *Handling a sand core.*



A Keller Pneumatic Hoist seldom needs service. But if it does, one man can make replacement in a few minutes—avoiding the delay and "down time" that sometimes keeps whole departments idle for half an hour or more.

LIGHT WEIGHT—300 and 1,000 lb capacity Hoists weigh 30 lb; 1-ton model weighs 75 lb

VARIABLE SPEED with finger-tip control permits accurate handling and spotting of fragile loads

CONTINUOUS DUTY air motor permits hoist to be used without interruption hour after hour

DUST, FUMES cannot injure an air motor, or affect its service

CANNOT BURN OUT even if stalled all day long!

LOW MAINTENANCE because of simple, rugged construction

KELLER
Air Hoists
IDEAL FOR ROUGH TOUGH FOUNDRY JOBS

KELLER TOOL CO., 4520 Race St., Grand Haven, Mich.

Please send me illustrated literature and prices of Keller Air Hoists.

Name_____

Title_____

Company_____

Address_____

City_____ Zone____ State_____

(*Continued from page* 210)

Mr. LaVelle stated that separately cast test bars test only test bars, not castings. Their purpose is to show properties of the alloy and characteristics of the melt and heat treatment. It is almost impossible to show properties of castings with such bars.

The speaker said that test bars are standard castings and should be designed to achieve reproduceable results rather than the best possible properties from any given melt. He discussed various test bar designs, gating systems, proper melting techniques, fluxing and heat treating, stating that pouring is the most important factor in producing good test bar castings.

With regard to properties, Mr. La Velle commented that large grain size and porosity, caused by high pouring temperature, give lower properties than fine grained castings, resulting from comparatively low pouring temperature. In concluding, he outlined proper methods of measuring and calculating various properties.

The question period brought forth the comment that, generally speaking, metal at a given temperature is the same regardless of how it arrived at that temperature. However, it was pointed out that metal heated to 1400°F and cooled rapidly to 1250°F often retains gas, whereas the same temperature metal cooled slowly has a chance to rid itself of gas.

Donald L. Colwell, Apex Smelting Co., Chicago, spoke on "High Strength Aluminum Alloys Without Heat Treatment," at the second nonferrous meeting. Mr. Colwell limited his remarks to five high strength alloys, namely, ZC 81 A and B, ZG61A, ZG61B which have gross ratios of zinc to magnesium of 10 or 20 to 1, and ZG32A and ZG42A, having zinc-magnesium ratios of about 2 to 1.

In considering other elements contained in these alloys taken as a group, Mr. Colwell stated that copper should be under 0.75 per cent and silicon between 0.15 to 0.3 per cent. These elements should be kept to a minimum if the alloys are to maintain their high strength properties. Iron should be held to 1.3 per cent or less; manganese at 0.05 to 0.5, the higher percentage being required in G32A and ZG42A for its toughening effect. Also 0.3 per cent chromium is added to those two alloys and to ZG-61A for increasing tensile and yield strengths, hardness and elongation. Titanium in amounts of 0.2 per cent or less is added to all the alloys as a grain refiner.

Have Many Good Properties

Sand cast properties of the high strength alloys are 29,000 to 44,000 psi tensile strength, 13,000 to 40,000 psi yield strength, 1.5 to 12.0 per cent in 2 in. elongation and brinell hardness (500 kg, 10 mm) 50 to 80. Chill cast properties are 33,000 to 53,000 tensile, 15,000 to 43,000 yield, 6.5 to 22.0 elongation and 55 to 95 brinell. Castings of the alloys are said to have high corrosion resistance and machinability, good dimensional stability, no tendency to natural growth, good brazing characteristics and good castability.

The two malleable iron sessions were presided over by Charles Bunting, Rockwell Mfg. Co., Barberton, O. First paper, on "Effect of Oxidizing Rates During Cupola Melting on the Graphitization of Malleable Iron," was given by Milton J. Tilley, National Malleable & Steel Castings Co., Cleveland. It is presented in full in this issue, starting on page 109.

James H. Lansing, technical and research director, Malleable Founders' Society, was the concluding speaker. He gave an informative analysis of

(*Continued on page* 214)

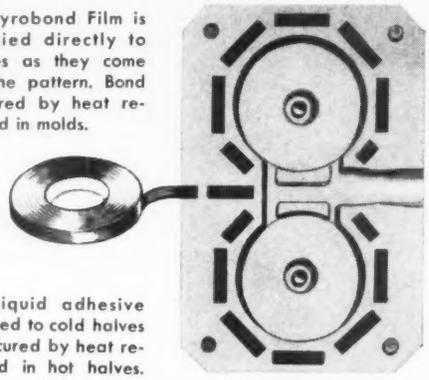
new... for shell molding

PYROBOND adhesive BONDS Shell Mold Halves... gives you these important advantages

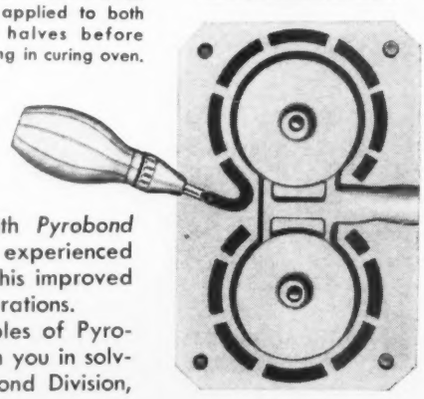
1. Tighter, more uniform closure of mold halves; eliminates need for bolts and clamps.
2. Seals closely and securely around mold cavities.
3. Eliminates need for shot or silica backing in most cases (a critical problem in shell molding).
4. Simplifies reclaiming process; adhesive disintegrates . . . no bolts or clamps to recover.
5. Bonded molds easy to handle and store.

TWO methods of bonding molds with PYROBOND adhesive

1. Pyrobond Film is applied directly to halves as they come off the pattern. Bond is cured by heat retained in molds.



2. Liquid adhesive applied to cold halves and cured by heat retained in hot halves. Also applied to both cold halves before placing in curing oven.



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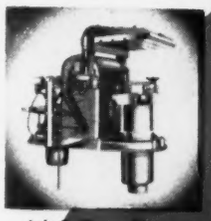
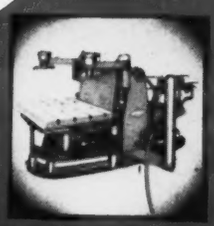
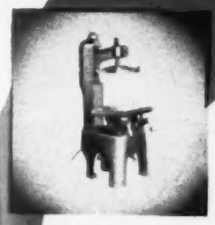


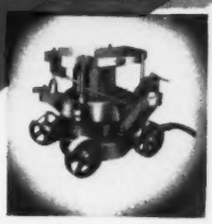
Jolt Roll-over Draw, Model A



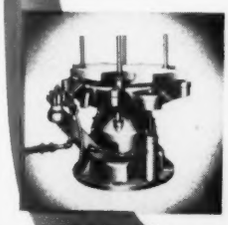
Jolt Roll-over Draw, Model SA



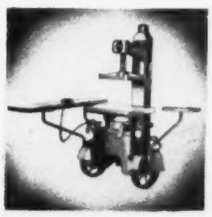
Jolt Squeeze, Model 10-JX (stationary)



Jolt Pin Lift, Model AJS (portable)



Jolt Pin Lift, Model AJS (stationary)



Jolt Squeeze Model 10-JX (portable)

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DAVENPORT MACHINE AND *Foundry Company*
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(*Continued from page* 212)
gating and feeding practice of malleable iron castings, showing sketches of various castings to illustrate how and why they were gated and fed in the indicated manner.

The speaker made these general suggestions: Make the sprue as small as possible to minimize rehandling; if there is a choice, place the gate where it is easiest to remove; make the feeder the maximum dimension that can be removed by breaking rather than by cutting; use a high feeder rather than one of large diameter; employ chills as an aid to directional solidification.

The steel sessions were opened by Chairman Victor E. Zang, Unitcast Corp., Toledo, O., who introduced the first speaker, Patrick Collins, Michigan Steel Castings Co., Detroit. Mr. Collins' subject was "A Modern Method of Determining and Utilizing Grinding Wheel Efficiency in Incentive Pay Systems," a method which Mr. Collins described as basically a technique of work measurement. Pointing out shortcomings of conventional systems of measuring work, he called for a permanent system which avoids problems arising from fluctuation in quality of castings, from the tendency of piecework compensation to freeze rates so that a firm does not benefit from the results of research, and from the unsatisfactory nature of measurements of workers' time.

Mr. Collins' company has developed such a system for use wherever electrical machines play a major part in production. Using a device called the Workometer, developed by Stewart Instrument Co., Michigan Steel is able to measure the expenditures of time and energy required by a given job and to set up compensation on a basis of "work units" rather than on that of piecework. Mr. Collins stated that the use of this instrument in conjunction with time study and standard data can raise production and lower costs wherever castings must be cleaned.

Concluding steel session had William S. Pellini, Naval Research Laboratory, Washington, as speaker. His discussion of metallurgy and mechanics of hot tearing comprises an article starting on page 124 of this issue.

Examine Defective Castings

The first of two gray iron sessions, presided over by Henry J. Trenkamp, Ohio Foundry Co., Cleveland, was addressed by John A. Sharritts, manufacturers' representative, Cleveland. In discussing his experiences as a gray iron foundry superintendent, Mr. Sharritts said that basic foundry practice revolves around the factors of quality, production, cost and people.

The speaker emphasized the importance of tracing back to determine the cause of defective castings in the interest of improving and maintaining high quality. In the matter of production Mr. Sharritts recommended efficient planning so that available equipment, manpower and materials are adjusted to provide the best balanced operation and meet required delivery dates. Adequate cost practice requires careful study of equipment, materials and methods, and should encompass all departments to determine total man-hours required for each job.

Speaking of the factor of people, Mr. Sharritts pointed out that foundries must give attention to working conditions to attract the desired type of employees. He also stressed the need for an adequate training program, particularly for supervisors, so that replacements are available as older men retire.

(*Concluded on page* 216)

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Use BUCKEYE Silica Firestone!
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• FOR MALLEABLE AND DROP FORGE FURNACES

Nature has endowed Buckeye Silica Firestone with every feature needed in modern refractory material. Its widespread efficiency, long life and attractive cost are well known to foundry and steel mill executives everywhere.

Under conditions where comparative tests have been made, Buckeye is first everytime! Its natural, uniformly-balanced combination of chemical and mechanical properties makes its superiority unquestioned. Its microscopically open and porous structure provides exceptional resistance to heat and abrasion.

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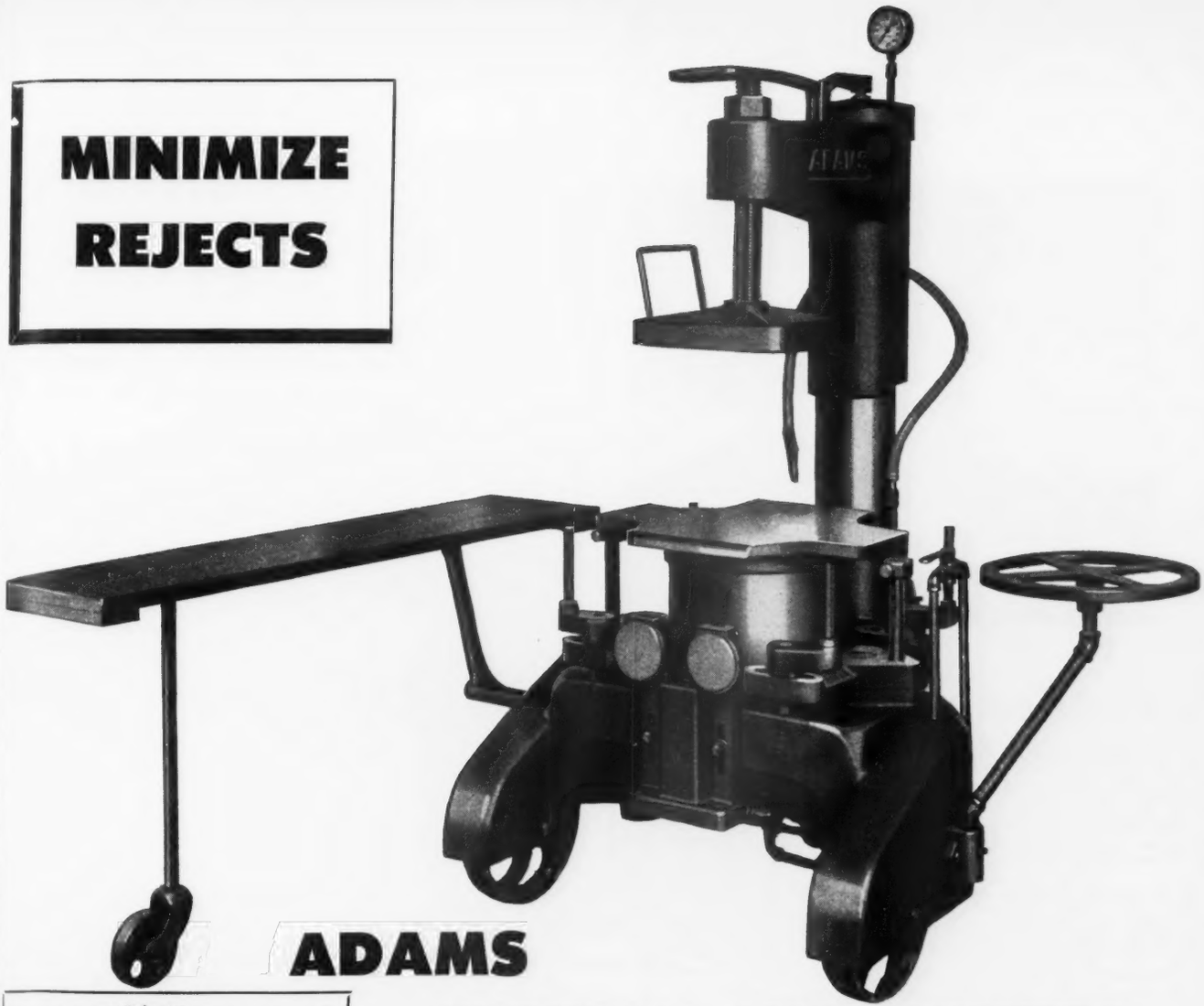
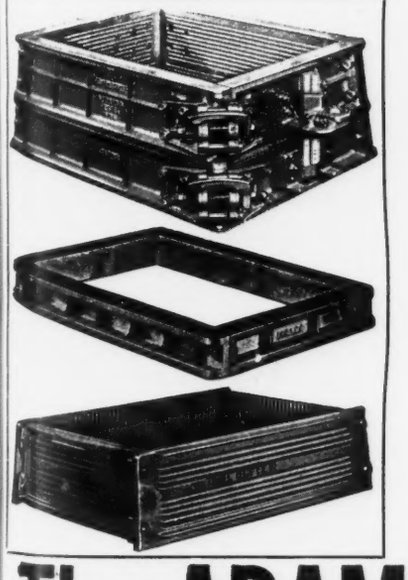


ADAMS



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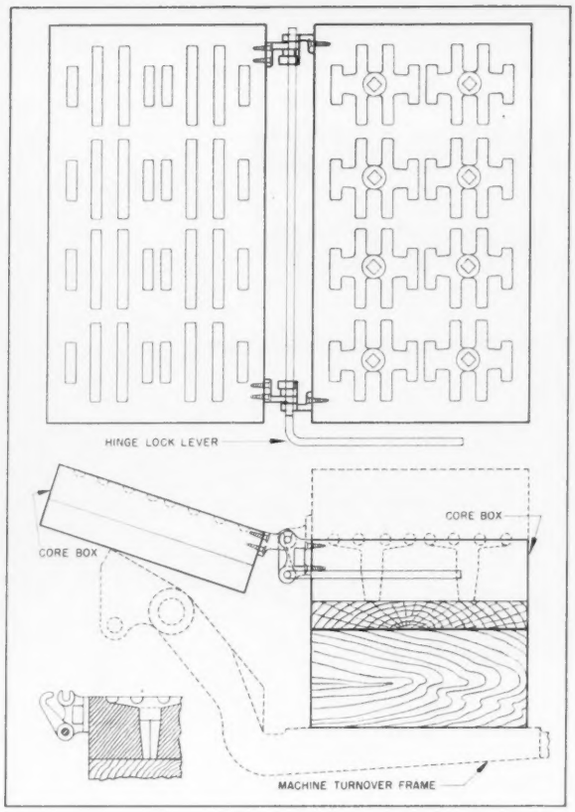


Loose Hinge on Book Corebox Facilitates Core Removal

By L. D. PRIDMORE, president, International Molding Machine Co., La Grange Park, Ill.
as told to ROBERT H. HERRMANN, associate editor, *FOUNDRY*

BOOK COREBOX mounted on a rollover coremaking machine utilizes a loose, clamp-type hinge for assembling cope and drag. When the core has been rammed up, the hinge is opened, the drag removed, and a drier placed in position on the cope. As shown in the illustration of the machine, a clamp is locked against the drier to hold it in position while the entire assembly is rolled over so that the drier rests on supports on the other side of the machine (left in the illustration). The clamp, then, is released and the cope removed to leave the cores resting on the drier ready for baking. The gimmick in this application is the come-apart hinge. Details are shown in the drawings above.

Do you have any tricks of the trade tucked away with your foundry experience? Why not release them to fellow foundrymen? FOUNDRY will pay a minimum of $10 for each idea submitted and published. Send a photo or drawing with your idea

(*Concluded from page* 214)

Second and last speaker at the gray iron sessions, presided over by Henry Trenkamp, Ohio Foundry Co., Cleveland, was A. J. Dublo, Sterling Foundry Co., Wellington, O., who discussed "Cupola Melting and Other Techniques Used in the Production of Machine Tool Castings." The key to quality production, Mr Dublo said, is constant, close supervision. He stressed that his firm, which employs 250 men and pours 65 tons of metal daily, has found that the laboratory and research facilities which make a quality control program possible are not only practical for a foundry its size, but invaluable to it.

Elaborate, permanent records are kept at his foundry of such factors as the causes of foundry scrap and returned scrap so that the errors which caused them can be avoided in future operations. For every lathe bed casting which leaves the shop a permanent record of its production history is kept. All materials used to charge the cupola are carefully weighed and recorded. Both sand and metal are checked numerous times daily in both the laboratory and the shop.

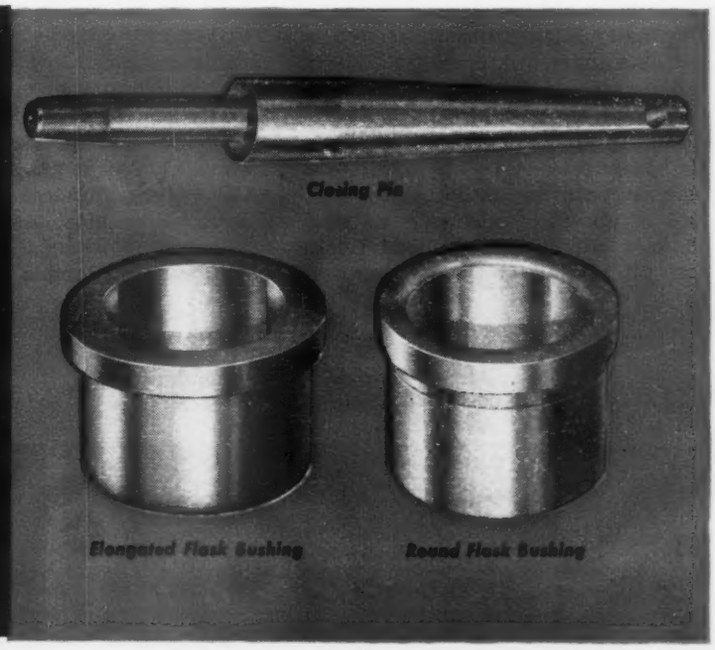
Safety Rules Are Listed For Conveyor Operation

Ten rules for the safe operation of conveyors were presented by Jervis C. Webb, executive vice president and general manager, Jervis B. Webb Co., Detroit, in an address at the 40th National Safety Congress and Exposition at Conrad Hilton Hotel, Chicago, Oct. 23. Speaking for the Conveyor Equipment Manufacturers Association, Mr. Webb suggested:

1. Never put a conveyor system into operation until it has been turned over formally by the manufacturer. 2. Be sure drive machinery is guarded. 3. Keep lubrication piped to safe points. 4. Provide adequate clearances for maximum loads. 5. Consider visibility in locating controls and in loading. 6. Confine operation of conveyors to authorized employees. 7. Leave repair to maintenance employees. 8. Provide a smooth cover under slat conveyors to avoid shearing. 9. Insist on no riding and no stepping on conveyors. 10. Instruct employees doing loading to consider clearances, visibility, protruding hazards and danger of tumbling.

UNIVERSAL flask pins and bushings can convert wasted time into money in your foundry

Universal Flask Pins and Bushings save precious minutes by assuring instant, accurate alignment of cope and drag. Since they are heat-treated and precision ground from high quality steel to stand up under rough treatment, Universal Flask Pins and Bushings also save the cost and down-time that replacement always requires. Cope Bushings are quickly guided to Drag Pins over tapered, loose-fitting Closing Pins which are easily removed after assembly. The special elongated Flask Bushing is designed to permit longitudinal expansion to compensate for metal heat *without affecting accurate alignment.* Standard sizes are carried in stock — special sizes and types to order. Direct your inquiries and orders to the office nearest you — 1060 Broad St., Newark, N. J., and 5035 Sixth Ave., Kenosha, Wisconsin — or write to our home office.



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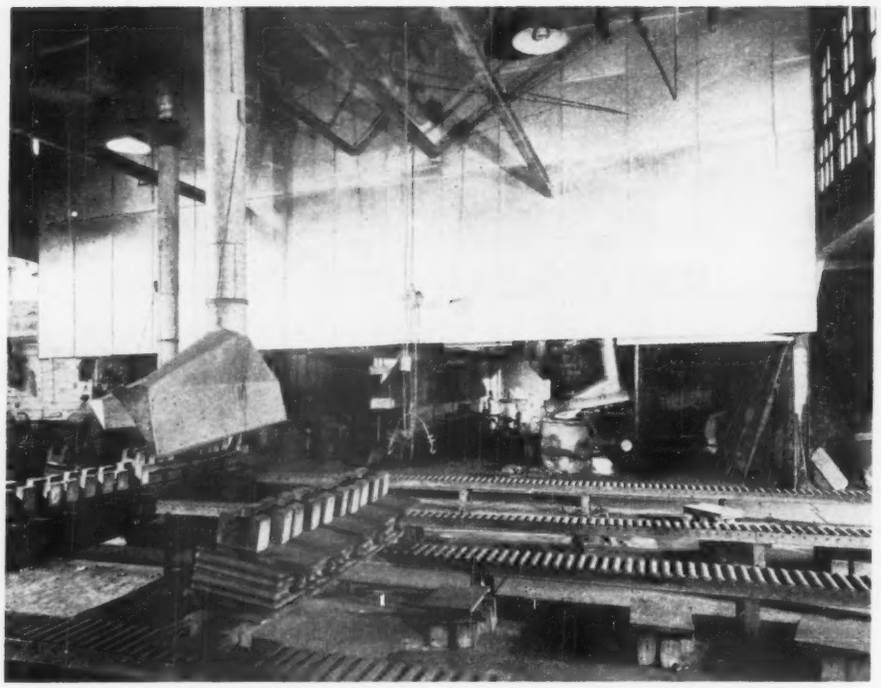


The canopy around the melting room was lowered to 8 ft above floor level. With it in position, any fumes are swept away by ventilating system before they have a chance to circulate

Proper Ventilation Improves Foundry Working Conditions

SAGINAW BEARING CO., Saginaw, Mich., recently solved a heating-ventilating problem serious enough to threaten its workers' health by instituting a new ventilating system and installing warm air furnaces. The foundry was plagued with an exceptionally high rate of absenteeism among its shop workers, attributable to lead fumes that filtered out of the melting section of the 150-ft-long rectangular building.

Blamed for most of the trouble was an outmoded ventilating system. Arrangement of the wall fans ridding the building of most of the foul air did little but pull the fumes from the melting furnaces and across the area where men assigned to other jobs were working.

Repeated attempts to remedy the situation by installing new heating systems and other draft fans proved futile because of the inability to keep the fumes from slipping under a canopy, designed to confine them to the melting area, and into the rest of the building. Addition of each fan only created more of a vacuum in one area and drafts in others.

Last winter the company obtained the aid of the Michigan State Industrial Health Commission to find an answer to the situation. Full-scale tests followed, during which it was determined what could be done to alleviate the problem.

Jackson & Church Co., Saginaw engineers, were asked to help plan a new heating installation, ductwork and revisions in the ventilating system for ridding the area of fumes and introducing fresh outside air.

One of the first changes made was to alter the canopy around the melting room by lowering it to within 8 ft of the floor to keep most of the obnoxious odors from seeping out into the other working areas. This was abetted by ductwork suspended over pouring areas and leading to overhead fans which had been installed earlier to help carry melting furnace fumes from the area before they had a chance to circulate.

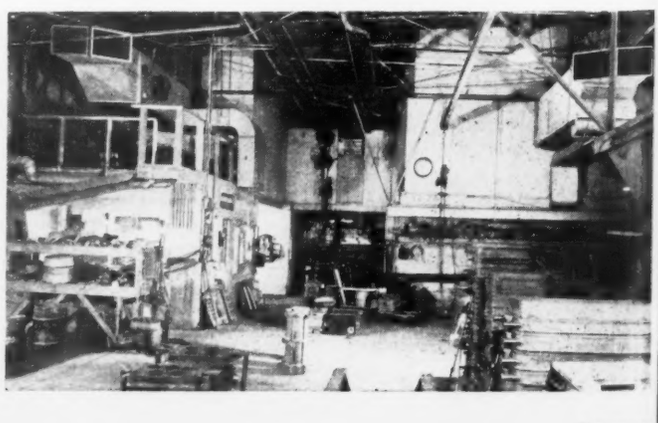
Two furnaces were installed to heat the plant. Each of the suspended units is capable of a 450,000 Btu output and a replacement of 5000 cfm of tempered air. They were suspended from corners of the 22-ft ceiling parallel to each other at the opposite end of the room from the melting area. Only ductwork needed was for piping fresh air to the units, angular plenums to throw the warm air in the desired directions and a piece leading from one of the units to a rear shipping room.

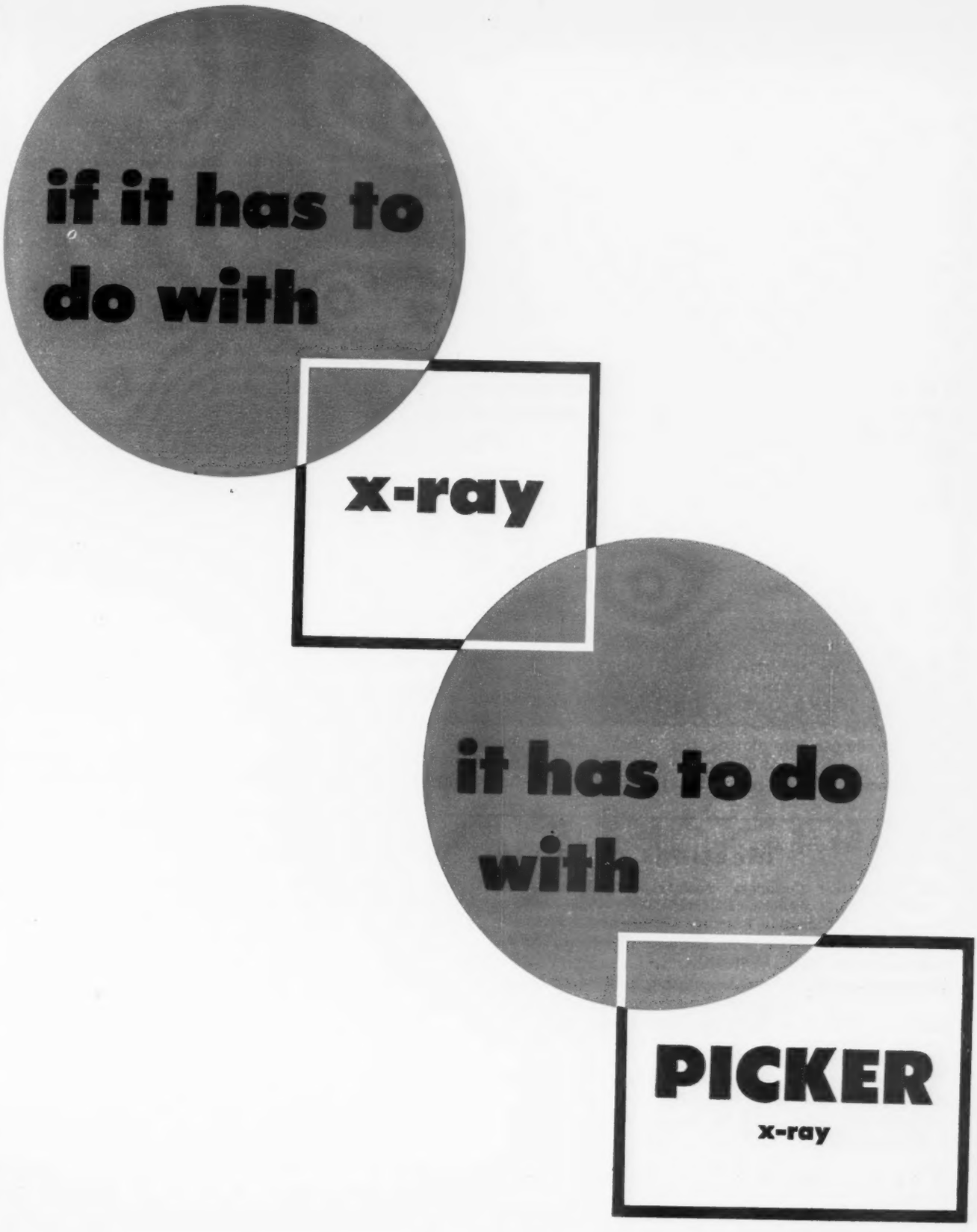
It was determined that the new ventilating system would exhaust

(*Concluded on page* 220)

View inside canopy shows melting furnaces at right. At the left is the suspended ductwork up which the pouring fumes escape

Twin suspension furnaces provide either heat or fresh air. Each one can deliver 450,000 Btu and replace 5000 cfm of air





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(*Concluded from page* 218)

22,000 cfm of air from the plant, meaning that 12,000 cfm of air had to enter the building by means other than the furnaces. This was provided by installing two of the new wall fans close to the ceiling and near the melting area which generates enough heat to warm that section of the building. Through a curtain arrangement the untempered air from the outside was introduced into the building so that it blended with the warm air around the canopy of the melting room before it came in contact with the employees.

While the area adjacent to the melting room received ample warmth from the melting furnaces plus fresh air from the overhead fans, the suspended heaters supplied the balance of the working area with fresh, warm air.

Because the plant did not work at night during the winter months, it was unnecessary to keep a constant flow of fresh air coming into the building during the "off" hours. Consequently the makeup duct on either unit was closed off and a damper on another duct on the same furnace opened in order that the air inside the building could be drawn back into the furnace and recirculated. A bulb thermostat in the plenum of each unit made it possible to keep the desired temperature during the day. The unit not needed during the "off" hours was shut off completely.

During the summer months when heat is not needed the suspension units continue to act as ventilators. Fresh air is circulated through the building by keeping the blowers on and the burners off.

Vocational Assets

(*Continued from page* 119)

designed for industrial use. Since the company for whom the inventory was taken had not done similar testing in the past, results of this particular test also served to establish minimum passing scores for each job classification which would be helpful in future hiring or upgrading.

All jobs require certain aptitudes for successful handling. These, of course, vary with the nature of the job. Each job classification to be inventoried, therefore, was first analyzed to determine what key factors were involved, and then a test battery selected to supply the necessary basis of measurement. In no case were less than five aptitudes nor more than seven required to establish such measurement.

It should be pointed out in this connection that the tests employed were for the purpose of measuring only the aptitudes to handle a particular job. Up to a certain level in a plant's job structure, this is the primary reason for success or failure. Above that point such factors as motivation, adaptability, personality traits and interests assume increasing importance. While in this particular instance only jobs of a primarily clerical nature were inventoried, aptitudes for mechanical, technical, sales and supervisory classifications can be similarly tested.

How the personnel inventory was made in each of the seven job classifications of the foundry in question is shown by the following:

Accounting Group—Individuals in this job classification made mental ability test scores ranging from a low of 14 to a high of 28. Considering the character of accounting work and the special ability necessary to perform it, these scores, especially those on the low side, are sufficient to raise the question of inadequate staffing in the activity. On the basis of these scores a median level or critical score of 23.4 was established. This meant that three men in the group scored above it and two below it.

Six factors were selected for aptitude testing. Each factor was rated as to its importance on the particular job, and the scores made by each man on each test factor weighted to reflect that importance. Total overall scores thus reflected the degree of aptitude qualification for the particular job. This was expressed in terms of "unqualified," "minimum

(*Continued on page* 222)

Meetings of Interest to Foundrymen

Nov. 6-8—Steel Founders' Society, annual technical and operating conference, Hotel Carter, Cleveland.

Nov. 6-8—All Canadian Foundry Conference, sponsored by Eastern Canada and Ontario Chapters, AFS, Mount Royal Hotel, Montreal

Nov. 10-11—Magnesium Association, annual meeting, Hotel Biltmore, New York.

Nov. 13-14—Southwestern Regional Foundry Conference, Texas and Tri State Chapters, AFS, Baker Hotel, Dallas, Tex.

Nov. 19 — American Standards Association, annual meeting, Waldorf-Astoria Hotel, New York

Nov. 20-21 — American Society for Quality Control, Midwest conference, Claypool Hotel, Indianapolis

Dec. 3-5—Society for Experimental Stress Analysis, annual meeting and exhibition, Hotel McAlpin, New York

Dec. 4-6—American Institute of Mining & Metallurgical Engineers, electric furnace steel conference William Penn Hotel, Pittsburgh

1953

Jan. 19-22—Plant Maintenance Show and Conference, Public Auditorium, Cleveland

Jan. 23—Malleable Founders' Society, general society meeting, Hotel Cleveland, Cleveland

Feb. 6-7—California Regional Foundry Conference, Berkeley, Calif.

Feb. 12-13—Wisconsin Regional Foundry Conference, sponsored by Wisconsin Chapter, AFS, and University of Wisconsin, Schroeder Hotel, Milwaukee

Feb. 19-20—Southeastern Regional Foundry Conference, sponsored by Birmingham, Tennessee, and University of Alabama Student Chapters, AFS, Tutwiler Hotel, Birmingham

Mar. 2-6 — American Society for Testing Materials, spring meeting, Statler Hotel, Detroit

Mar. 11-12—Foundry Educational Foundation, annual TAC-UAC conference, Cleveland

Mar. 17-18—Steel Founders' Society, annual meeting, Edgewater Beach Hotel, Chicago.

Mar. 23-27—American Society for Metals, western metal congress and exposition, Pan-Pacific Auditorium, Los Angeles

Apr. 9-10—Malleable Founders' Society, fourth annual market development conference, Cornell University, Ithaca, N. Y.

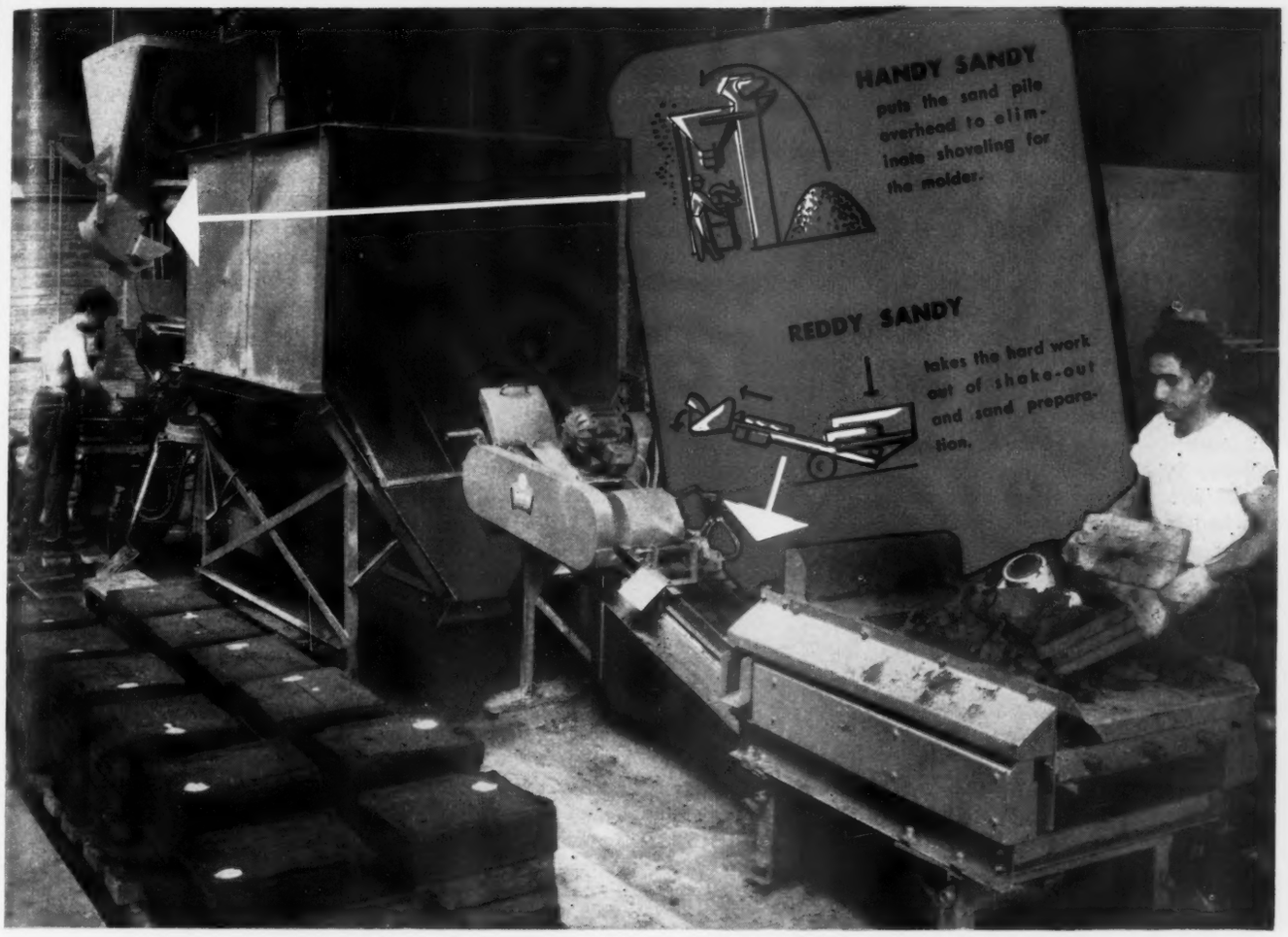
May 4-8—American Foundrymen's Society, annual convention, Chicago

June 8-10—Malleable Founders' Society, annual meeting, Homestead, Hot Springs, Va.

June 29—July 3—American Society for Testing Materials, annual meeting, Chalfonte-Haddon Hall, Atlantic City

Sept. 21-22—Steel Founders' Society, fall meeting, Homestead, Hot Springs, Va.

Oct. 8-9—Gray Iron Founders Society, annual meeting New Hotel Jefferson, St. Louis


HANDY SANDY
puts the sand pile overhead to eliminate shoveling for the molder.
REDDY SANDY
takes the hard work out of shake-out and sand preparation.

How Stemac, Inc. makes more molds with . . .*
. . . HALF THE LABOR

How much more are *you* paying than is necessary for shake-out, sand preparation and molding? The extra cost you pay for slower methods adds nothing to the value of your castings. It can only be written off as added expense. Why not save this money as Stemac, Inc. did by installing Reddy Sandy and Handy Sandy automatic sand preparing and handling equipment.

According to Mr. Alfred Hesse, Vice-President, "Stemac, Inc., Chicago,* Illinois has experienced a substantial increase in production while at the same time reducing foundry labor costs in the manufacturing of aluminum and brass sand castings for captive and jobbing purposes.

"The amount of labor required to shake out, condition sand, and perform the miscellaneous tasks necessary for efficient foundry operation has been reduced by approximately 50% when Handy Sandy and Reddy Sandy equipment is used.

"The rigid surface requirements demanded for our electrical fittings and lamps and for our jobbing sand castings necessitates the use of properly controlled and conditioned sand. The Handy Sandy and Reddy Sandy equipment enable us to achieve these requirements with a minimum of foundry labor."

Take the first step to lower foundry costs. Send for your copy of the new catalog: "Planned Mechanization for Foundries." It shows how Handy Sandy and Reddy Sandy equipment can make important savings for you.

NEWAYGO ENGINEERING COMPANY

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Manufacturers of Neway® Mold Handling, Sand Handling and Conditioning Equipment

(*Continued from page* 220)
qualified," "average qualified" or "well qualified."

Aptitude scores of all five men fell within the "minimum qualified" grouping. Again, this is a clue that manning of the activity should be studied. Ordinarily, there should be a wider "spread" in the aptitudes of a department's personnel, and certainly it would be advantageous to have a majority of the individuals qualified at a higher level than "minimum."

There was close correlation between scores on the mental ability and aptitude tests. The three individuals whose mental ability test scores were above the median point also had the three highest overall aptitude scores.

On the basis of testing done in this job area, these three men represent the least job "risks." The two men with the lowest test scores represent cases which call for special attention to determine whether or not replacement would benefit departmental efficiency and cost.

Checking and Card Writing—This group received the mental ability test and a battery of five aptitude tests. Mental ability test scores ranged from 4 to 31—such a wide "spread" for men performing practically the same work that the question of overstaffing should be studied. The median score for the group was 18.6, with 22 men scoring at or above that point and 14 below it.

On the aptitude tests, 23 men scored within acceptable limits. Of these, 14 also had scored above the median point on the mental ability test. There were, however, some interesting and informative discrepancies between the two sets of test scores.

Three men who ranked in the upper quarter of mental ability test scores had very low aptitude ratings —an indication that they might be more valuable if placed in some other activity. One man with a low mental ability test score had an "average" qualified score on the aptitude tests. This was traced to a language difficulty which worked against a better rating on the mental ability test.

A lack of correlation between test scores of this nature usually indicates that the individual in question either has particular job knowledge gained through long work experience or mental ability which is wrongly directed within a particular set of job requirements.

The particular interpretation drawn in this case was that four men in the group were considerable "risks" in the activity. In addition, seven men's test scores indicated that their performance should be studied closely to determine whether their abilities and aptitudes could not be employed to better advantage in another department.

Engineering Group—Mental ability test scores for this group were uniformly high, with individual scores ranging from 23 to 36. This relatively narrow spread and high range of scores indicate that the group has a better than average problem solving ability, flexibility to cope with conditions in which the individuals have had little previous experience, and the faculty for following fairly involved directions accurately within a minimum of time. These naturally are all excellent attributes for a job activity of this nature.

In the six aptitudes on which the group was tested, scores also were high. There was a very close correlation between scores on the mental ability test and aptitude tests. Since both professionally trained engineers and men whose training had been confined to practical on-the-job experience were in the group, these test results indicate that both selection of personnel and departmental supervision have been well handled.

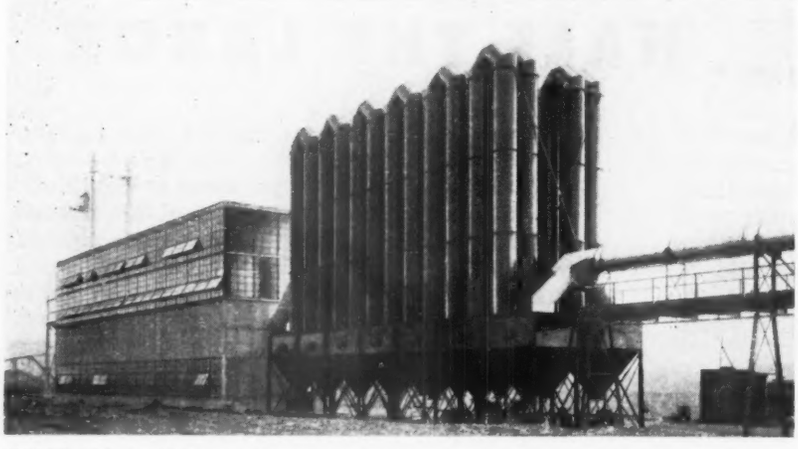
Production Planning and Control—This represented a new activity for the company, and a group drawn from various departments throughout the plant was being trained to staff it. Here, then, the primary purpose of the inventory was: 1. To help determine proper staffing for the activity; 2. To help decide which of the men in the training should continue with it; and 3. To get a "line" on the individual or individuals who, because of aptitude, should receive special attention for heading up the activity when it was established.

In view of the fact that the group had been "hand picked," mental ability test scores were spread to a surprisingly wide degree. The lowest score, 10, was made by two men, and one man made the highest score of 29. Median score for the group was 19, which meant seven in the group were at or above this level.

Seven aptitudes were selected as most important for the particular work. Scores on these tests showed nine of the group were "minimum" or "average" qualified. With one exception, the high scores on the mental ability test were made by those in the group qualified on the basis of aptitude scores.

(*Continued on page* 224)

New Installation Collects Zinc Oxide Fumes



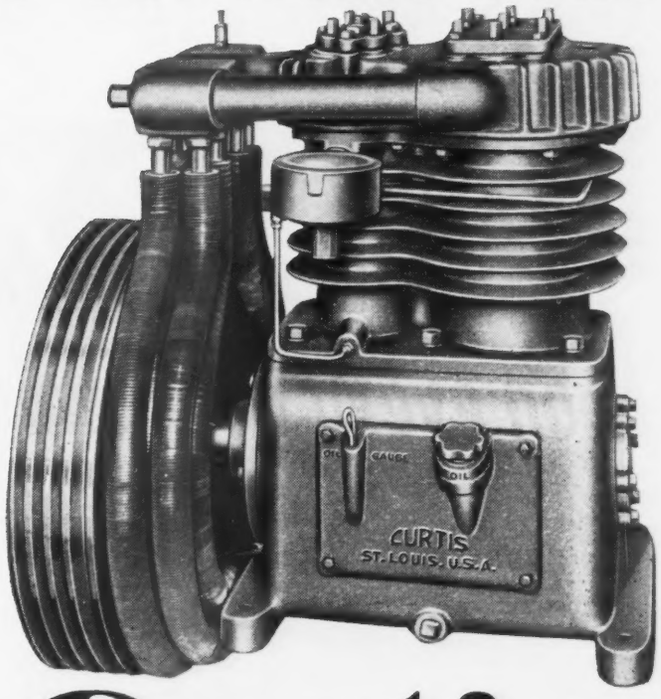
INSTALLATION of these modern facilities for the collection of zinc oxide fumes was completed recently by R. Lavin & Sons Inc., Chicago, producer of nonferrous metals. This addition to the Chicago plant continues the program of modernization which was begun in 1946 with the establishment of similar equipment at the company's North Chicago subsidiary.

Primary function of the "bag house" is to conserve zinc fumes in the form of oxide, which is used extensively in industry, but the Lavin firm is equally interested in the elimination of harmful smoke in its industrial area.

Months of preliminary planning with Chicago sanitation engineers and the technical staff of Dracco Corp., Cleveland, preceded installation of the equipment. This included extensive research by the company's engineering staff, combined with data collected by men in the field who inspected other smoke control procedures.

MORE AIR Per Horse Power

- IT'S TWO-STAGE
- IT'S AIR COOLED
- SELF OILING



The New Curtis

MODEL 98 AIR COMPRESSOR

TWO-STAGE AIR COOLED 15 AND 20 HORSEPOWER

TWO-STAGE — More air per kilowatt hour, assuring savings in power bill.

AIR-COOLED — No expensive water bills; eliminates plumbing installation costs.

INTERCOOLER — Four section, finned, providing unusually effective cooling between stages; cooled by cyclone of air from fan flywheel

SELF OILING — Simple, positive centro ring method; provides pressure lubrication of connecting rod and pistion pin bearings.

TWO TIMKEN MAIN BEARINGS — Tapered rollers; provide easy adjustment made externally without dismantling compressor.

VALVES — Readily removable as assembled units without removing cylinder head or breaking pipe connections or gasket joint.

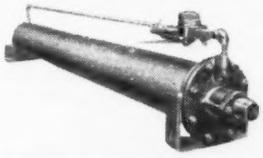
CRANKSHAFT — Counterbalanced, drop forged — two main bearings — no overhung bearing.

PRECISION WORKMANSHIP — Assures long life and minimum maintenance.

EXPERIENCE — Backed by 99 years of manufacturing — assures you dependable, troublefree service.

Available as a simple compressor or base mounted — motor driven.

LET ONE MAN DO THE WORK
with this Curtis air-operated equipment.



AIR CYLINDERS — for almost any pushing, pulling or hoisting operation.

AIR HOISTS — for low-cost lifting or lowering of materials or machines.

-726

CURTIS PNEUMATIC MACHINERY DIVISION
of Curtis Manufacturing Co.
1995 Kienlen Avenue, St. Louis 20, Mo.

I am interested in items checked below:

☐ THE NEW MODEL 98 ☐ AIR HOISTS ☐ AIR CYLINDERS
☐ AIR COMPRESSOR

Name.....

Firm.....

Street.....

City.....Zone....State.....

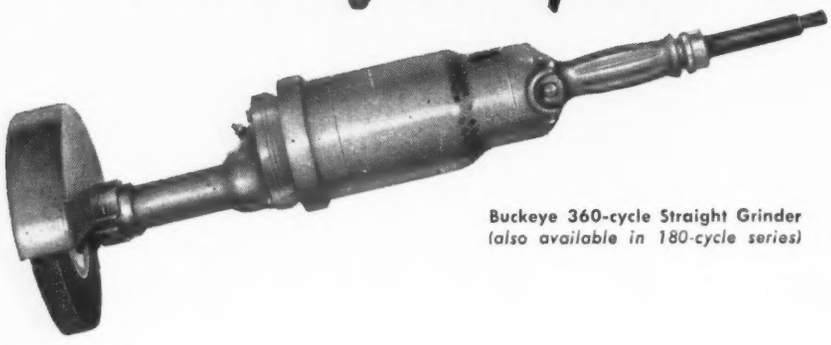
CURTIS PNEUMATIC MACHINERY DIVISION of Curtis Manufacturing Company

1995 KIENLEN AVENUE • ST. LOUIS 20, MO.

Buckeye 360-cycle Right Angle Sander
(also available in 180-cycle series)

▶ SAVE $28.75

▶ on every new pinion!



Buckeye 360-cycle Straight Grinder
(also available in 180-cycle series)

On all electric tools, the pinion gear is subject to wear and replacement.

On many electric tools, replacing an inexpensive pinion also requires replacing an expensive rotor.

On Buckeye electric tools, the pinion is detachable and is easily replaced without even disturbing the rotor and shaft, which are dynamically balanced to insure smooth, quiet operation.

In short, whenever you do have to replace a worn pinion, you can save $28.75, plus a great deal of maintenance time and effort—IF you're using Buckeye electric tools.

▶ what are you waiting for?

CATALOG E-10 *contains complete information and specifications on Buckeye 360 and 180 cycle portable drills, screwdrivers, nut-runners, straight and right-angle grinders, sanders, buffers, polishers.*

Buckeye Tools
CORPORATION
DIVISION 20 • DAYTON 1, OHIO

Portable Air and Electric Tools for Industry

IN CANADA: Joy Manufacturing Co. (Canada) Ltd., Galt, Ontario

(Continued from page 222)

As a result, the recommendation was made that seven men continue the training and be considered as a nucleus for the new activity. Because of marginal scores on both tests, one man should be continued in the training, but on a probationary basis. In addition to these recommendations, minimum test scores also were set up as an aid in the selection of additional personnel to be trained for the new activity.

Sales—Individual scores on the mental ability test revealed an out-of-balance condition within this job classification. Two of the men made identical scores of 37, two made scores of 22, two scored 12, one scored 11, and one scored 5. On this basis the median score for the group was 19.75, but if the two high scores are disregarded, the median falls to 14, which is low for an activity of this nature.

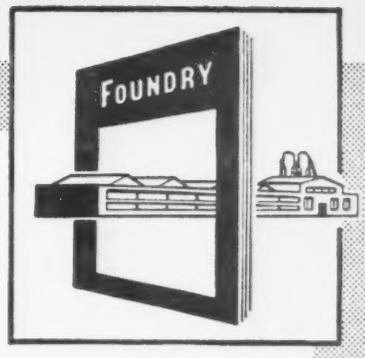
Five aptitudes were selected as important for success in this particular type of work. Results of these tests showed only four of the men qualified, by aptitude, for the job. These were the same four who had scored highest on the mental ability test. The sharp difference between the test scores of these four men and the rest of the group is indication that the activity, at least in part, might be improperly staffed and therefore expensive to operate.

Schedule Group—Much the same results came from testing this group as in the one just described. Mental ability test scores were in the 5-25 range, with a median score of 15, meaning four men were at or above this level.

The group also was tested on seven selected aptitudes. Individual scores showed one man "average" qualified, six "minimum" qualified and two "unqualified" for the particular work. Reasons for the lack of closer correlation between the two test scores have been covered in another connection. Even in face of the apparent discrepancy, however, the testing did show that three men potentially could develop most in the particular job classification, and that two others should be regarded as considerable job "risks" until proved otherwise.

Stores Group—Actually, two departments were involved here, each under separate supervision although both engaged in comparable work. Considered as a single unit, mental ability test scores ranged from 0 to 33, with a median point of 15.4. However, when considered separately the median scores were 11.1 and 20.3, re-

(Concluded on page 228)



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Our staff will forward this information to the advertiser immediately so you'll be relieved of the necessity of writing several letters. You'll hear from the advertiser directly, answering your request.

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FIRST CLASS
PERMIT No 36
(Sec. 34.9 P.L.&R.)
Cleveland, Ohio

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No Postage Stamp Necessary if Mailed in the United States

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Cleveland 13, Ohio
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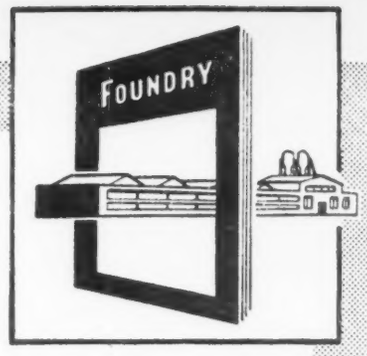

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FOUNDRY
Readers Service

For positive carbon control use MEXITE® Briquettes in every cupola charge

Each briquette is the carbon equivalent of 50 lbs. of pig iron

- MEXITE prevents troublesome carbon variations throughout the heat by supplying a dependable source of soluble carbon . . . Use MEXITE for metallurgical carbon, use your coke for fuel.
- MEXITE is flexible . . . it can be used for carbon raising throughout the heat or at any time during the heat.
- MEXITE maintains the desired carbon analysis even when charging 100% scrap.
- MEXITE improves castings by reducing shrinkage defects due to low carbon.
- MEXITE means better fluidity, lower chill and hardness and easier machinability by insuring maintenance of the carbon analysis.

Let our experienced foundry engineers give you all the facts about MEXITE . . . write us for detailed engineering bulletin.

173

THE UNITED STATES GRAPHITE COMPANY

DIVISION OF THE WICKES CORPORATION • SAGINAW, MICHIGAN

(*Concluded from page* 224)

spectively. Only three men in one of the groups made scores at or above 15.4, with the balance of the group scoring from 2 to 15 points lower than that.

The sharp cleavage between the two groups was further borne out by the results of the aptitude testing. Eleven of the seventeen men were "minimum" or "average" qualified. Of this number, seven came from the group with the higher mental ability test scores. Three of the second, or lower, group were qualified on the basis of aptitude test scores and these three were the only ones with above median mental ability test scores in their group.

A condition such as this is a signal that both hiring practices and supervision of the lower group should be studied immediately and closely.

In summary, this personnel inventory supplied management with information on possible weak spots, individuals with special aptitudes to be considered when promotions are to be made, and with factual data useful in future hiring.

While the inventory described here was conducted in a large plant with a number of people in identical categories, it can be used to equal advantage in smaller concerns where one or two individuals staff a particular activity. Further, such an inventory method, once set up, can be taken periodically in the future by regular company personnel. With rising labor costs, maintenance of profit margins calls for such factual evaluation on a continuing basis.

Book Review

Chemical Engineering Techniques, by B. E. Lauer and Russell F. Heckman, cloth, 496 pages, 6 x 9 in., published by Reinhold Publishing Corp., New York. Price $6.

Because they feel that most chemical engineering texts do not, despite other virtues, stress the fact that there is a systematic arrangement of the methods of chemical engineering, the authors have chosen in this volume to "point out the basic objectives of chemical engineering and to present some of the more important techniques now available for reaching them." They emphasize that there are usually many methods of reaching the same objective and that unit operations or methods should not be mistaken for ends, but should be recognized as means to the true ends.

It is on this basis that the various techniques are presented, classified according to function. The book is in six sections—"The Assembly of Material," "The Preparation of Materials for Reaction," "The Production and Distribution of Energy," "Conditions Affecting the Chemical Reaction," "The Separation and Purification of Materials" and "Further Treatment of Products for Sale, Shipment, Storage or Other Use." It is indexed. Mr. Lauer and Mr. Heckman are, respectively, professor and assistant professor of chemical engineering at the University of Colorado.

Agricultural Castings

(*Continued from page* 117)

where toughness and shock resistance were requirements in the metal. For uses where higher strength, wear resistance and rigidity than in normal malleable iron — accompanied by a reasonable amount of toughness—are required, pearlitic malleable has found a considerable market. Such applications include differential gear cases, brake spiders, gear shifter forks and equalizing links for tractors.

Nodular iron has not replaced malleable iron in tractors and implements to the extent that was predicted several years ago. Applications of the former have been mostly replacements of high-strength gray iron, carbon steel forgings and, more recently, as a substitute for some carbon steel castings that were in short supply because of the national defense program demands.

Steel—One of the outstanding developments in use of steel castings the last few years has been the growing popularity of cast-weld assemblies. These have included both the welding of castings to castings and the joining of castings to rolled steel parts. By this method, important production economies have been effected in numerous instances where previously an all-cast part or a rolled steel weldment had been employed. In addition, a stronger structure frequently has resulted from the redesign. Much of this work on the redesign of parts to permit cost savings in their production stems from a research and development program of the Steel Founders' Society of America.

To illustrate the advantages of cast-weld fabrication, take the case of the drive spacer units for a certain tractor (Fig. 3). These are required in five different sizes and originally were made as one-piece steel castings averaging 52½ pounds in weight. Separate patterns, coreboxes and flask equipment were needed for each size.

(*Continued on page* 231)

SOUTHWEST REGIONAL CONFERENCE

To Be Held in Dallas, Nov. 13-14

ANNUAL Southwest Regional Conference will be held at the Baker Hotel, Dallas, Tex., Thursday and Friday, Nov. 13-14. This will be the third regional gathering in Texas of foundrymen from the southwestern states. Previous meetings were held in Houston and San Antonio.

Sponsoring groups for the two-day discussion of technical subjects are the Texas, Tri-State and Texas A. & M. College chapters of the American Foundrymen's Society.

Tentative program of the conference, which will open at 10 a. m., Nov. 13, includes three general meetings in addition to two sectional meetings on gray iron, steel and nonferrous subjects. "Sand" will be discussed at one general meeting by Earl Woodliff, Detroit, and H. W. Meyer, General Steel Castings Co., Granite City, Ill. C. E. Winninger, National Engineering Co., will speak on sand reclamation at another general session, while the concluding one will have William Busby, Texas Foundries Inc., Lufkin, speaking on "Standard Costs" and William M. Ball, R. Lavin & Sons, Chicago, discussing "Human Engineering."

Gray iron sectional meetings will include a talk on gating and risering by Harry H. Kessler, Sorbo-Mat Engineers, St. Louis, and one on ferroalloy use by Herman Pfeifer, Electro Metallurgical Co., Houston. Speakers at steel sessions will be John B. Caine, Cincinnati, and H. G. Schlicter, Beardsley & Piper Division, Chicago. At nonferrous sessions, brass and bronze will be discussed by W. W. Edens, Allis-Chalmers Mfg. Co., Milwaukee, and aluminum by D. L. LaVelle, Federated Metals Division, New York.

AFS Vice President Collins L. Carter, Albion Malleable Iron Co., Albion, Mich., will address one of the luncheon meetings, and a talk on safety and accident prevention by F. H. Kobely, United States Steel Co., San Francisco, will feature the Friday luncheon. The conference will conclude with a banquet Friday evening.

Social events include the traditional Texas barbecue Thursday evening and a special entertainment program is planned for the ladies.

MALLEABRASIVE®*

(SHOT AND GRIT)

Gives You the Lowest Overall Cleaning Costs You've Ever Had

and Pangborn can prove it, without any cost to you!

THAT'S a mighty strong statement to make—and Pangborn wouldn't dare make it if we couldn't prove it! We challenge you to test Malleabrasive in your own shop for 30 days! We make all the arrangements, provide the forms, supervision, etc. Your machines are expertly adjusted by Pangborn engineers to get the greatest benefit from Malleabrasive. The test is run fairly, scientifically — your work schedule is never interrupted. At the end of the 30 days, you'll have proof that Malleabrasive has done a better cleaning job at lower overall cost than any other abrasive!

We *know* we can convince you, because we've *already proved* Malleabrasive in foundries all over the country. What's more, since Pangborn *makes* blast cleaning machinery, we have tested *all* the abrasives, to determine the best. Malleabrasive won on all counts!

The *original* premium abrasive, Malleabrasive has approximately 50% longer life than other premium abrasives—2 to 4 times the life of ordinary abrasives. It reduces down-time and protects your investment because Malleabrasive makes machinery parts last longer. It turns out perfectly cleaned parts *every time*, and actually costs far less per ton of castings cleaned!

Don't just take our word for it! Let Pangborn engineers run this impartial test in *your* shop. For more information, write to: PANGBORN CORPORATION, 1400 Pangborn Blvd., Hagerstown, Maryland.

Malleabrasive Guarantees
Lower Cleaning Costs
and Better Cleaning Jobs
Than Any Other Abrasive!

Packed in orange striped 100-pound bags

Look to Pangborn for the latest developments in Blast Cleaning and Dust Control equipment

Pangborn

*U.S. Patent #2184926 (other patents pending)

BLAST CLEANS CHEAPER
with the right equipment for every job

May we tell YOU what we know about

SHELL MOLDING

?

Equipment for Shell Molding

We manufacture shell molding equipment of unique and advanced design. It has been proven in production and is available in types and sizes including small inexpensive machines to fit your particular requirements. If you would like to know more about shell molding equipment, we will be glad to send you complete information.

Patterns for Shell Molding

We have developed a truly revolutionary new process (patents applied for) for making low-cost shell mold patterns *from your present pattern equipment.*

Engineering Service on Shell Molding

We have been designers and builders of machine tools and special machinery for the past 25 years. Our experience and "know-how" on shell molding is, we think, rather broad. We have an established research, development and test laboratory for studying shell mold problems and processes. *We invite your questions.*

Bulletin "F"—If you will send us your particular questions, we will be glad to discuss them for you and will be happy to send you a special Letter-bulletin "F" which deals with the services described above.

WINTER ENGINEERING COMPANY & SHELLCAST CORP.

1200 NIAGARA, BUFFALO 13, N. Y.

(*Continued from page* 228)

The units were redesigned to incorporate two simple steel castings plus one piece of pipe cut to required length and welded to the castings. The five different sizes of spacer units now are provided merely by using different lengths of pipe, while the castings' dimensions are the same for all sizes. This fabricating method reduced the cost of the part more than 38 per cent and cut its weight 30 per cent. Production was facilitated by confining patterns, coreboxes and flask equipment to only one size instead of five.

One of the most extensive applications of steel castings to a farm implement is for the specialized heavy-duty plows being built by a West Coast manufacturer. These are fabricated entirely of cast steel. In the case of a two-way mold board plow the castings replace a rolled steel type of construction.

Nonferrous — Among developments in nonferrous castings is a new method sponsored by the Aluminum Co. of America to permit more economical production of certain types of aluminum castings. The method is particularly adapted to parts of complicated design which ordinarily can be made only as sand castings and which involve considerable core work.

The process consists essentially of making several comparatively simple castings and then brazing them together to form the desired end product. Brazing, of course, is not a new process, but recent improvements in aluminum brazing materials and techniques make possible the application of this joining method to casting alloys. Obviously, the cost saving and other advantages of the process can be most fully realized in the case of large-volume production which would permit the component parts of the final casting to be made economically in permanent molds.

A case in point is the internal combustion engine cylinder head (Fig. 5). These heads ordinarily are cast of gray iron in cored sand molds. Because of their shape they are not adapted to production in permanent molds, even if made of aluminum. In making a head as a brazed assembly, four individual castings are first produced. They represent four layers which, when assembled sandwich-like, comprise a complete head. However, each casting is of relatively simple shape and has no deep recesses that would require cores or preclude production in a permanent mold.

The castings have been produced in a non-heat treatable aluminum alloy having excellent brazing characteristics, good corrosion resistance and a relatively high melting range—1120-1190° F. It has a tensile strength of 35,000 psi, yield strength of 18,000 psi, elongation of 8 per cent in 2 inches, and brinell hardness of 70. The brazing alloy is used in sheet form and is stamped out like a gasket to the contour of the mating faces of the adjoining castings. Alcoa brazing flux No. 33 is applied to the joining surfaces of the slices to permit the filler metal to wet them.

In the brazing operation the assembly is brought up to 1085° F in about 18 minutes, removed from the furnace and allowed to cool in air to about 900° F, then water quenched. Any loss of strength in the casting alloy as a result of the brazing operation's annealing effect is said to be restored in about one week at ordinary atmospheric room temperature.

While commercial production of brazed aluminum cylinder heads still is in the future, several automobile companies are actively investigating its possibilities. In addition to the advantage of increased heat radiation and somewhat higher engine horsepower afforded by an aluminum head, the casting surfaces have the good finish and accurate section thickness typical of a permanent mold product. These latter properties minimize cleaning and machining operations, and contribute to the relatively low overall cost of the finished product.

Various other aluminum castings lend themselves to production by this brazing method. In experimental

(*Concluded on page* 234)

MALLEABLE FOUNDERS' SOCIETY

Holds Fall Industry Meeting

ANNUAL fall industry meeting of the Malleable Founders' Society, held at the Hotel Cleveland, Cleveland, Sept. 26, featured reports on several society activities, discussion of progress of the Foundry Educational Foundation, a talk on a basic economic training program, and consideration of the part business must play in the coming election. Frank D. Brisse, president of Laconite Malleable Iron Co., Laconia, N. H., and president of the society, presided at the meeting.

A progress report of Core Materials Research Project No. 3 was presented by James H. Lansing, technical and research director of the society. This study is based on investigations being conducted in a number of member plants, and is providing considerable information of particular interest to the malleable industry. Mr. Lansing cited results of the study on the number of companies who weigh core binders and sand, the length of mulling time, and the range of baking temperatures. He stated that the report presents a table of mixes which will permit selection of the mix best suited to the particular job. In conclusion, he discussed ways in which the report can be used to best advantage.

W. A. Kennedy, Grinnell Co., Providence, R. I., and chairman of the society's Technical Council, stressed the importance of the first part of the study in which 50 members have participated. He stated that the second part of the project would be equally valuable to the industry and would cover a variety of subjects, including dry core binders, synthetic resins, core oils, factors affecting baking time; speeding baking time, core collapsibility, and release agents.

George K. Dreher, executive director, Foundry Educational Foundation, Cleveland, presented an illustrated talk on the FEF, its history, gains and future opportunity. He pointed out that the FEF now is an effective tool of foundry management.

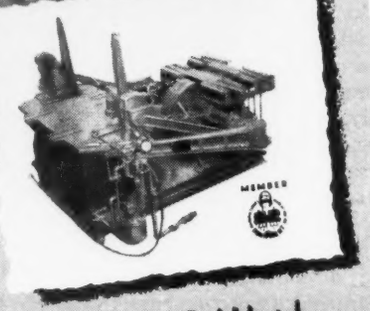
Lowell D. Ryan, managing director of the society, announced that the 1953 annual meeting of the MFS will be held at the Homestead, Hot Springs, Va., June 8-10.

Ben Bennett, supervisor, economic training, Republic Steel Corp., Cleveland, speaking on "Basic Economics —A Basis for Understanding," outlined his organization's course on basic economics for supervisors. The course consists of 15 directed conferences dealing with these subjects: A look at our economy; managing your income; understanding prices; producing for better living; your wages; exploring costs; profits; Republic's economic system; Republic's balance sheet; Republic's income statement; what makes America great; understanding money and banking; inflation and your dollar; what price security; and the challenge ahead. In conclusion, Mr. Bennett stated that management is the only group left that can revive interest in our freedom system.

At luncheon, Ralph M. Besse, Cleveland Electric Illuminating Co., Cleveland, told the group that business must aid in the coming election. Industry should oppose big central government; help educate the electorate in the complicated field of foreign affairs; and participate in government personally.

Herman

HILLS-McCANNA COMPANY, CHICAGO



MEMBER

This Foundry Is A Good Place To Work

FOUNDERS of non-ferrous alloys since 1870, this plant enjoys an enviable reputation for the production of quality magnesium castings. Complete facilities make it a good place to work: Castings are poured on a conveyor line, each ladle being checked for correct temperatures; elaborate materials handling facilities include large cars for shuttling flasks to shakeout stations, continuous overhead sand handling equipment, core racks, and castings cleaning equipment.

Skilled technicians are employed to maintain strict metallographic and physical laboratory control over all phases of production. A complete X-Ray department is in daily use. Grinding and pickling, heat treating, and machine shop departments complete the plant facilities.

Good housekeeping practice, good personnel relations, good management, are additional factors that make this plant a good place to work.

The 1500 lb. capacity Herman rollover machine illustrated is typical of a battery that are used at this plant. These and all Hermans require little training to operate. One rotary valve controls all operations. Patented rollover action provides a complete 180° rollover with power applied on only 90° of the roll!

May we show you how all Hermans have made their way by the way they're made?

Herman MOLDING MACHINES

HERMAN PNEUMATIC MACHINE CO. UNION BANK BUILDING, PITTSBURGH 22, PA

The ad reproduced herewith originally appeared in the December 1949 issue of FOUNDRY.

MOLDING MACHINES

help make this foundry a good place to work

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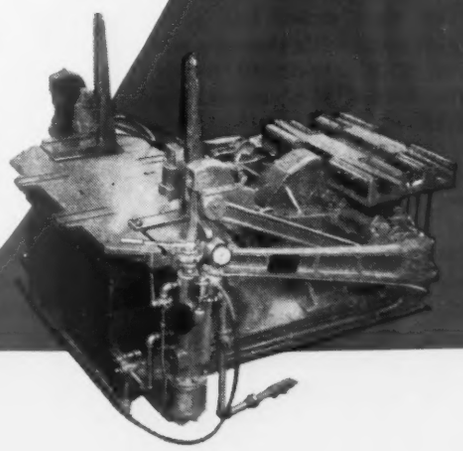

Herman **MOLDING MACHINES**

HERMAN PNEUMATIC MACHINE CO., UNION BANK BUILDING, PITTSBURGH 22, PA.

(*Concluded from page* 231)

work it has been employed to fabricate engine blocks. In this case the joints between the component castings are vertical, and a brazing alloy in sheet form again is used.

Shell Molding—No development in recent years has attracted so much interest in the foundry industry as the subject of shell molding. The fact that the process is adapted to production of both ferrous and nonferrous castings partly accounts for the widespread attention it has received. In addition, several producers of resins used in the mold sand mixture have done considerable investigational work on the process and have helped to publicize it.

From the casting user's standpoint the principal attractiveness of shell-mold castings is their potential cost saving. This saving should be judged by the cost of the finished machined part, not that of the rough casting. Actually, shell-mold castings are relatively expensive to make, but they offer economies in many instances by eliminating much of the cleaning and machining required on conventional sand castings.

Physical properties and internal soundness of shell-mold castings appear equal or somewhat superior to those of sand castings. Surface finish and dimensional accuracy also are superior. Tolerances of 0.003-in. per in. are attainable in iron, aluminum and copper-base alloys on fairly large castings. While dimensional tolerances of shell-mold castings lie between those of sand castings and precision investment castings, it is believed that if castings approaching the size of those made in shell molds were manufactured by the investment process, no greater degree of tolerance would be obtained.

In attaining dimensional accuracy, the user of shell molds has some factors to contend with that are not encountered with investment molds. One is the necessity of assembling two mold halves along a parting line, therefore requiring care to prevent dimensional errors in the mating of the halves and in removing metal fins along the parting. Another is that the investment caster can overcome the problem of draft in a comparatively complicated casting by making an assembly of composite wax or mercury pattern pieces. This is not possible in the case of shell molding.

The parting line of a shell mold also creates difficulty in attaining outside diameter concentricity on a vertically parted cylinder. In experimental work it has been found that the OD dimension along the parting line will frequently produce castings up to 0.035-in. smaller in diameter than the OD dimension 90 degrees from the parting line. On some castings this difference is of little or no consequence. If it does matter, the deficiency can be partly overcome by allowance on the pattern.

It should be pointed out that every casting design is not suited to the shell molding process. Because tooling costs are relatively high, the necessary production volume to absorb this cost is a basic requirement. Moreover, the casting design must lend itself to a suitable parting and gating arrangement.

No definite size limitations have been established for shell-mold castings. A roller for a track type tractor has been produced by shell molding with an as-cast weight of 175 pounds. Automotive engine blocks reportedly have been made on a commercial basis in Europe by the process.

Study Mechanization Possibilities

Much of the development work in shell molding the last year or two has been concerned with equipment and materials that will mechanize the mold-making operation and speed up the process. Several mold-making machines, largely automatic in operation, have been placed on the market in recent months. They are capable of producing 45 to 60 shells an hour and can be operated by unskilled labor.

Numerous advances in foundry facilities and operating practice in recent years have contributed to the steady increase in production of all types of castings. This culminated in all-time record shipments in 1951 of 19 million tons, and attests to the continued acceptance of castings as one of industry's leading basic materials.

Concurrent with this growing tonnage has been more efficient foundry practice as measured by worker productivity—a direct result of the extensive adoption of mechanized equipment. For example, relating number of production workers to tonnage output shows that productivity in iron and steel foundries recently has been nearly 20 per cent greater than in 1947. Farm implement and tractor foundries have been among the active participants in this trend toward modernization and mechanization.

Sources of Illustrations

Fig. 1—Caterpillar Tractor Co., Peoria, Ill.

Fig. 2—International Nickel Co., New York, and Lynchburg Foundry Co., Lynchburg, Va.

Fig. 3—Steel Founders' Society of America, Cleveland.

Fig. 4—Monsanto Chemical Co., Springfield, Mass.

Fig. 5—Aluminum Co. of America, Cleveland.

Fig. 6—Cooper Alloy Foundry Co., Hillside, N. J.

Harnischfeger Opens New Office at Birmingham

P&H Overhead Crane Division, Harnischfeger Corp., Milwaukee 46, has opened a new sales office, warehouse and service station in Birmingham which consolidates all territory formerly served by P&H offices in Memphis, Tenn., and Jacksonville, Fla. Harnischfeger will retain sales representation in those two cities, but major functions will be centralized in Birmingham.

Ray M. Calkins, a veteran of 28 years with the company, has moved up from his position as Memphis district manager to take charge of the new plant and territory. He was director of Memphis area activities from 1945 and served in P&H's engineering, specifications and stores department before he became assistant sales manager of the company's small excavator division in 1938.

RAY M. CALKINS

The new warehouse and service station will occupy an area of 10,000 sq ft and are connected with a modern sales office of 1500 sq ft. They are located on a 4-acre site in the Broyles area of Birmingham at 1628 Vanderbilt Rd. The opening was celebrated on Oct. 11 with an open house and barbecue.

Beryllium Corp. Opens Philadelphia Office

Beryllium Corp., Reading, Pa., has opened a district sales office in the Suburban Station building of the Pennsylvania Railroad, Sixteenth St. and Pennsylvania Ave., Philadelphia. Richard T. Baureithal, district sales representative, is in charge of the new office, which will offer technical assistance in design and fabrication to users and prospective users.

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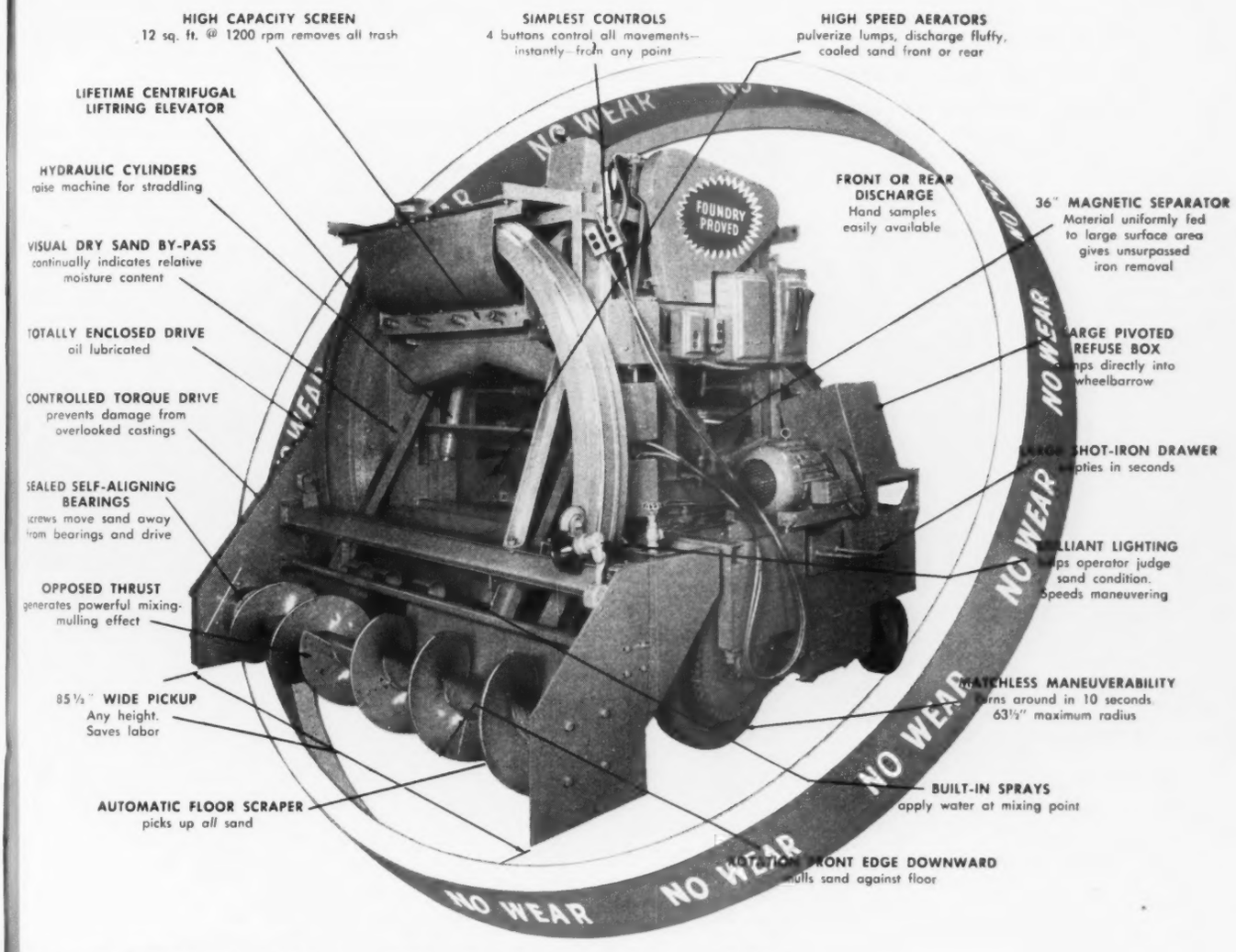
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prevents damage from overlooked castings
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WRITE TO

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Effect of Raw Materials on CUPOLA OPERATION

By BERNARD P. MULCAHY
President
Fuel Research Laboratory Inc.
Inidanapolis

This seventh of a series of articles discusses types of cupola fluxes, their function in obtaining clean metal, and how to judge efficiency of the slag during melting

ALMOST all cupolas require fluxing as general practice, and the extent and character of the flux employed is a function of the other materials used. In most instances when the overall operation is good, fluxing will be at a minimum. Or to state the converse, when difficulty is encountered fluxing may also be excessive.

The reason for the above is that when a cupola is in distress almost all palliatives are applied and, of course, additional fluxing is also resorted to as a corrective.

Actually, excessive fluxing can be a costly corrective and without assurance of benefit. Lining erosion may increase and bridging aggravated. All of this can result in: a. Increased flux cost. b. Increased lining repair cost. c. Poor melting conditions.

Although the principles of fluxing are easily applied in a broad sense, as usual the underlying reactions are complex and very extensive. It is possible, however, to establish a reliable and safe practice employing a few fundamental factors.

The function of the slag is to remove the extraneous siliceous materials, oxides, etc. from the molten iron in a purifying process.

The usual materials so removed are: coke ash, dirt accompanying the scrap, sand accompanying the returns, rust on the scrap, oxides formed in melting, eroded lining.

The materials used for fluxing are: Limestone, high calcium; limestone, dolomite; sodium carbonate, various forms; fluorspar.

Several other forms of calcium carbonate are employed, such as oyster shells, marble, etc., but these are generally localized. There are also several prepared fluxes used, but they also contain the above materials as the active ingredients.

Limestone and sodium carbonate are basic in character, which is the chief reason for their use. This alkalinity neutralizes the acid character of the sand and the lining, and additionally absorbs the acid sulphur compounds.

Fluorspar, although slightly acid in character, serves as a very efficient slag liquefier, and since the amount required is small, it can be used safely without materially affecting the overall alkalinity.

The most generally used material is high-calcium limestone, the requirements of which are low content of impurities and size. The action of the limestone is its calcination or reduction to CaO, which in turn combines with the silicates.

The dolomite limestone contains magnesium carbonate in amounts ranging from 20-45 per cent. This stone decomposes at a lower temperature than the high calcium stone and some operators prefer it.

In most cases either stone will work equally well if the purity is high. If the stone itself is dirty, its effectiveness is materially lessened because it uses up a large portion of itself to flux the materials it contains. It is essential, therefore, that only a good grade of stone be used.

Visualizing the function of the flux we can see that a flushing action of the stock materials is first required. In this manner the metal is partially cleansed, and the ash of the coke also melting is removed by the slag to keep the surface clean. Descending through the coke bed the slag forms a blanket on top of the metal.

The slag blanket serves a very useful function. The drops of metal almost always contain some slag and the blanket will trap this slag as the iron passes through. Additionally the blanket serves as protection against the blast, by furnishing an insulated wall or covering over the metal, permitting further separation of the slag from the metal and shielding this metal from oxygen.

It now becomes obvious that we need favorable characteristics in the slag for efficient operation. These are:

1. Sufficient alkalinity to induce maximum absorption of sulphur and the acid oxides.
2. Sufficient fluidity to permit rapid separation of the slag from the metal.
3. Sufficient volume to retain the extraneous materials. Fluxing of a cupola generally has not been too well designed or practiced. This is largely due to the fact that the process is complex chemically, and the individual requirements are extremely varied. Additionally, the affinity of the alkaline flux for the acid lining has tended to result in an equilibrium in the slag which has made it very difficult to determine by chemical analysis the actual condition of the flux during operation.

In determining the proper fluxing conditions for a particular cupola the amount of materials to be removed must first be considered. The simplest and most practical method is as follows:

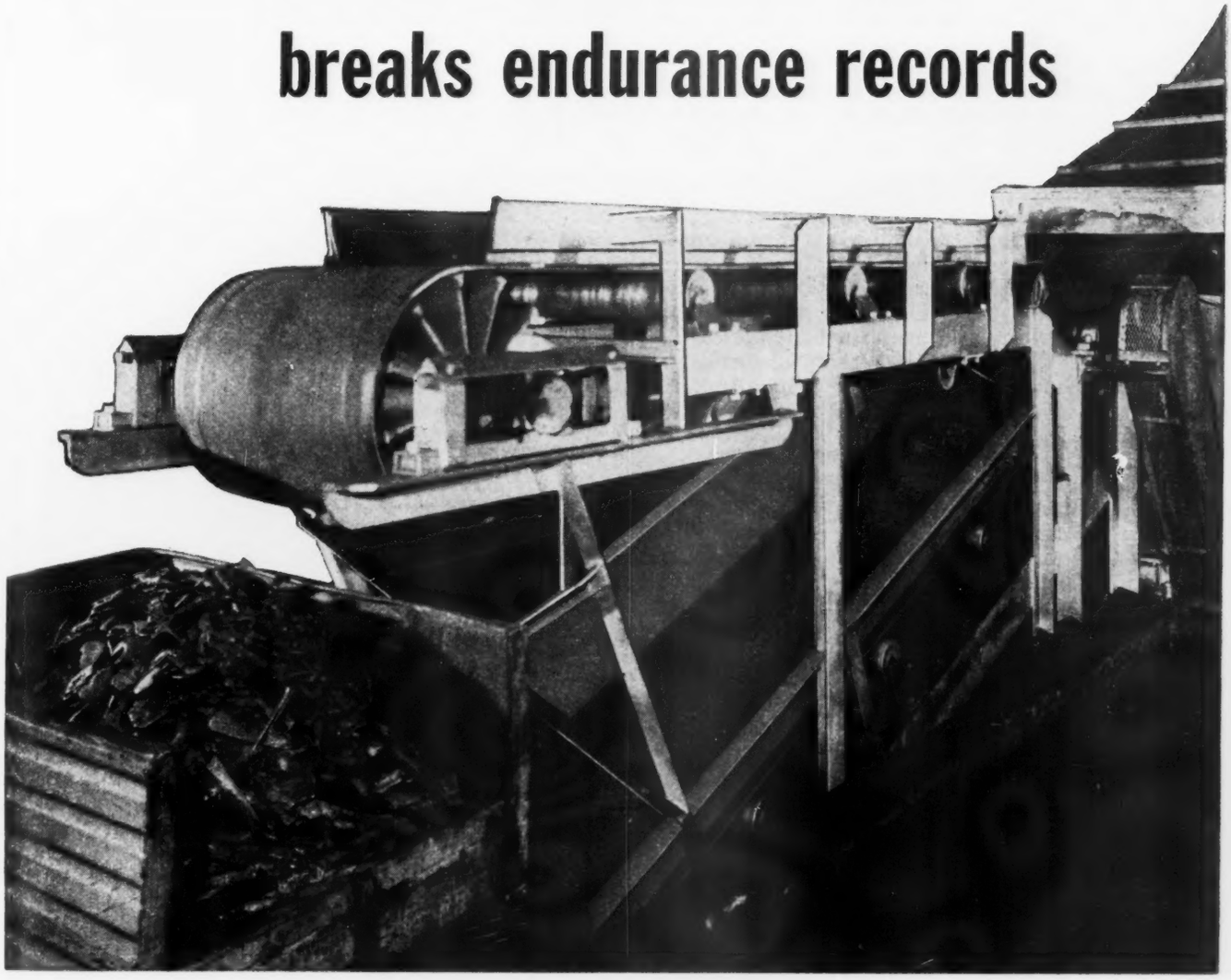
Assuming an average condition of the metal charged, both scrap and returns, it has been found that an amount of limestone representing 3 per cent of the metal charged is usually sufficient as the initial base amount. For a 2000 lb charge this would be 60 lb of limestone. When the scrap is excessively dirty add to the base figure 5 to 10 lb per charge more. Also, if the returns retain more than the usual amount of sand, more limestone will be required again, possibly 5 to 10 lb.

In most instances the 80 lb per ton of metal will be sufficient. However, other factors will affect the final amount used.

Soda ash is a valuable assistant in fluxing. Its high alkalinity is very effective in offsetting the neutralization resulting from the SiO_2 absorption so that the flux retains its alkaline state for removal of the sulphide, and the absorption of the oxides formed and natively present. High-sulphur scrap or coke will re-

(Concluded on page 238)

NEW foundry shake-out belt breaks endurance records



In one of the largest gray iron foundries in the world this rip-resistant NYB&P Shake-out Belt is still in service after 9 months of working 8 hours a day. This is more than twice as long a service record as any belt previously used! It is 30 inches wide; 5-ply; 110 feet center to center. It is only one of many NYB&P belts in this foundry.

The NYB&P Shake-out Belt is not only ideal for foundries, but also for any installation where there is constant danger of the belt being ripped. You will find that every NYB&P industrial rubber product is outstanding in performance and economy. For full information, contact your local NYB&P Distributor.

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(*Concluded from page* 236)

quire this additional treatment. Soda ash also increases the fluidity of the slag which in many cases is very beneficial.

Frequently it is desirable to increase the slag fluidity without requiring the additional alkalinity. This is accomplished by the use of fluorspar. Some objection exists toward the use of this material in the belief that lining erosion is increased. The writer is firmly convinced, however, that lining erosion is the result largely of other conditions and, although the flux is the dissolving medium, it can be controlled in this respect. This will be discussed in another section. Fluorspar can be used very effectively and generally 5 to 10 lb per charge is sufficient.

Many times the question has been asked how the limestone should be added. The reason for this is that it has been stated that when the stone is localized on successive charges, lining erosion is excessive. Obviously, this can happen but actually seldom does because the irregularity of the materials tends to distribute the stone. It is sufficient to state that if the stone is scattered over the center area on top of the coke, a proper distribution will result.

Bridging has also been frequently charged to either the kind of flux used or the amount. Actually this is seldom the case; in most instances bridging is the result of mechanical conditions within the cupola. This again is a situation where, of course, the slag is responsible but the bridge forms only because conditions are favorable toward its formation.

Slag hole freeze-ups are also generally assigned to the flux. The slag is the offending medium, but it would not freeze in most cases if the system of collection and discharge within the cupola were correct.

Dirty metal with slag inclusions in almost all cases is not the fault of the slag itself, but simply conditions which either favor slag entrapment due to agitation within the well or an improper tapping procedure.

The instances cited above were done so purposely to call attention to the fact that many difficulties assigned to the slag itself can be corrected and eliminated without recourse to changing the composition or amount of the slag. This must be thoroughly understood because it will then be possible to establish a dependable and efficient fluxing procedure. These corrections will be discussed in the succeeding section.

There has been a trend in recent years to remove all of the adhering sand from the returns on gates and risers. This may or may not be the correct thing to do. If the sand is excessive, certainly some cleansing should be employed. This is easily determined by the slag volume recovered and the amount of limestone employed. On the other hand, complete removal of the sand may result in excessive alkalinity with greater lining erosion.

A minimum volume of slag is required for good distribution and protection of the metal, but excessive volumes serve no useful purpose.

During periods of poor quality materials and pig iron shortage it becomes increasingly necessary to control fluxing conditions. A reduction in pig iron with its consequent increase in scrap will favor an increase in potential oxidation within the cupola. The entering carbon content of the charge is lower and the oxides charged are greater. If the slag is not correct for these conditions, it is almost certain that low-carbon iron will result.

As the ash content of a coke increases, this automatically requires more flux, but additionally high-ash cokes are more difficult to burn, resulting, of course, in potentially lower metal temperatures. If fluxing is not corrected, the slag obviously will be less fluid than desired with its consequent difficulties.

It was mentioned that scrap with heavier rust content can result in lower carbons. This is due to the fact that the serviceable acidity of the slag is consumed faster than normal, rendering it unable to perform its function in removing the oxides formed during melting. These oxides then react with the metal because they are free to do so.

Watch Color and Condition

One of the most readily available indexes of the efficiency of the slag or the state of oxidation within the cupola is the color and condition of the slag as it flows from the cupola.

When the slag is very light green and glossy, it is highly alkaline, due in all probability to excessive stone.

When the slag is dark green and glossy, it is about right for the current conditions of melting.

When the slag is black, dull and does not string well, it is highly oxidized. This can be due to either too much rust and dirt entering the cupola or actually poor conditions within the cupola.

To check this state of the slag, trap a little on a bar at the slag hole and allow it to string out. It then becomes translucent.

Judging the state of the slag when water quenched is difficult because of the frothy structure formed, so it is advisable to take slag before it hits the water.

It is almost impossible to produce an effective slag by the flux alone, regardless of the amount or kind. If conditions are not correct within the cupola to allow the slag to function properly, its effectiveness is quickly destroyed.

When conditions are correct for good melting, almost no difficulty is encountered with the slag, and even a relatively high scrap content can yield good clean metal.

In suggesting the amounts of 3 to 4 per cent flux the intent was to hold the quantity used to a minimum. This ratio will be found to be very satisfactory in most instances when conditions are favorable, particularly when the patching practice is sound and under control.

GANGWAY! By J. A. PATTERSON

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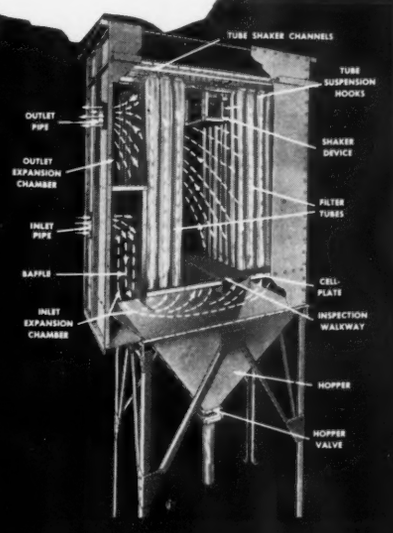

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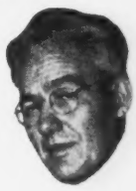

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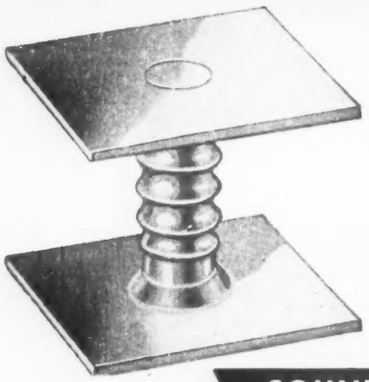

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COUNTERSUNK SHOULDERS ELIMINATE GAS POCKETS

Sharp, right angle shoulders of conventional type of chaplet form large gas pockets.

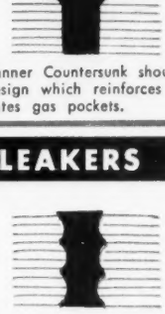
Raised shoulder of this type reinforces but tends to form small gas pockets.

Fanner Countersunk shoulder has a taper design which reinforces head and eliminates gas pockets.

FEATHEREDGE FUSION RINGS ELIMINATE LEAKERS

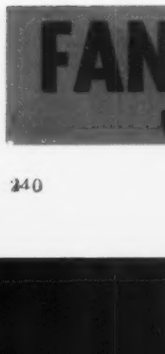
Rolling metal does not seal against straight side of conventional stem; small pockets remain.

Deformed stem offers better sealing surface for metal, but some voids may be created on inside radii.

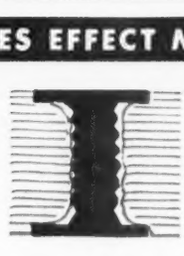


Knife-like edges of fusion rings heat instantly, fuse completely, eliminate leakers.

RADIUS GROOVES EFFECT MAXIMUM FUSION



Conventional chaplet fails to fuse completely both along stem and at shoulders.



Threaded stem creates gas pockets at base of threads.

Rounded grooves of Fanner chaplet permit metal to "lay up" close to stem and effect maximum contact and fusion.

Groovestem Chaplets either tin or copper coated are available in motor Button Head and Double Head types. They are stocked in substantial quantities to give you the fastest possible service. Order today.

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PATTERNS—Their Relation To Castings Production

ABC of Foundry Practice

By T. H. TREVITHICK

This is the first of a series of articles discussing principles governing the making of patterns for producing various types of castings from green sand, dry sand and loam molds. The author is retired foundry and pattern shop superintendent, General Electric Co., Schenectady, N. Y.

TYPES of patterns are known as: One piece, two piece or split patterns, matched patterns, skeletons and sweeps. As the name implies, a one-piece pattern is made up with no loose or separate parts and is molded either as a solid pattern or as a cored pattern. Even with a one-piece pattern a dry sand core may be used. This feature is taken care of by suitable core prints which make the impressions in which the core is placed.

A split or two-piece pattern is used when the general outline of the casting will not permit a one-piece draw. Therefore, a joint is made which allows the pattern to be molded in a two-part flask, the flask joint coinciding with the pattern joint line. Patterns may have a number of loose pieces in addition to the main joint. Loose pieces are attached to the main body of the pattern by dowel pins which are removed from the pattern during the molding process. The loose pieces are drawn out of the sand after the main body has been taken out of the mold. Projections also may be formed in the mold by placing a core print over the projecting piece. Later a core (Fig. 1A) is placed in the impression left by the core print.

Matched patterns is the term applied to a device in which a half pattern or group of patterns is mounted on two sides of a suitable board or plate, or alternatively, on one side of two boards or plates. In the smaller sizes, plate and pattern parts are cast as a unit. The plate or board has pin holes at each end to match the pin holes on the molder's flask. With a double face plate one molder makes the complete mold. With two single face plates one molder makes the copes while a second molder makes the drags. Accuracy of the casting joint depends on proper location of pins and pin holes.

The type of pattern must not be confused with the grade of pattern. This feature will be dealt with later. Grading of the pattern is determined by the number of castings to be made. Life of the pattern largely is governed by the manner in which it is handled by the molder. If some or all of the parts are too light or delicate to be made in soft wood, the patterns are made of hard wood or metal.

Skeleton patterns can be used when the outward shape of the proposed casting is fairly symmetrical. Fig. 1B shows a typical skeleton pattern for a drum or barrel shaped casting. The strickle at the top is used by the molder to scrape the sand or other material between the ribs to form a complete outline of the pattern. After the mold is made and parted, sand to the desired thickness of the casting is removed from between the ribs. Similar technique may be used in making a corebox.

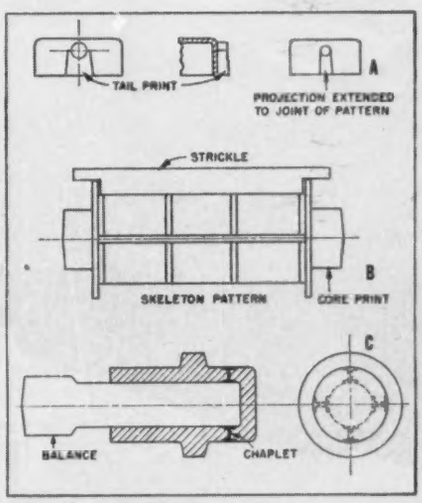


Fig. 1 A—Application of tail core print. B—Typical skeleton pattern and strickle. C—Shows core resting in print at one end and supported by chaplets at the other end

Coreboxes conform to the internal shape of the casting, also to the shape of openings and passages through the casting. Every cored part of a casting should have an outlet formed by a core print. In addition to supporting the core in proper position in the mold, the print serves as an outlet for the gas generated when the core is surrounded or nearly surrounded by molten metal.

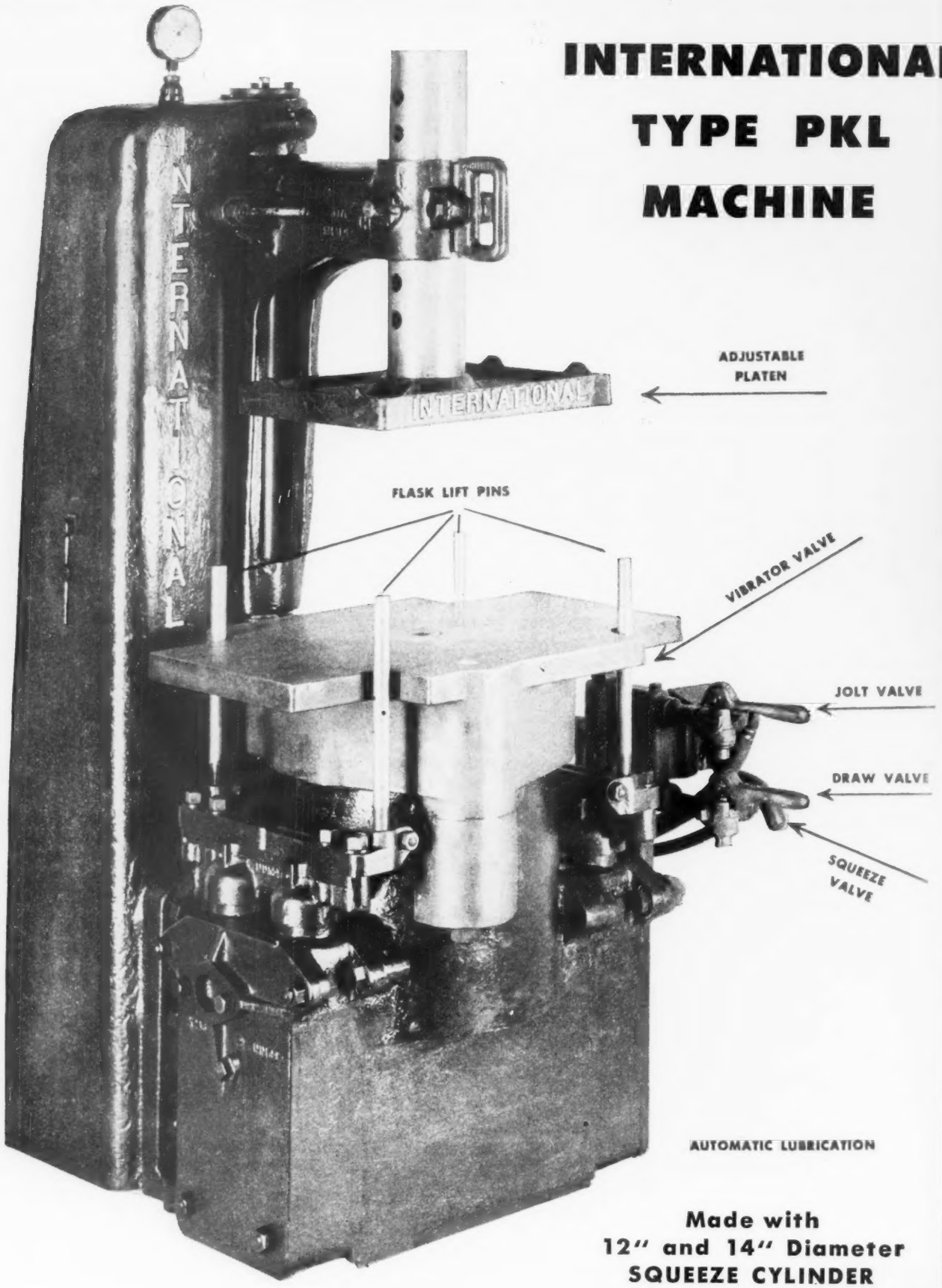
Chaplets are employed when sufficient support for the core cannot be formed in the mold. In addition to supporting the weight of the core, chaplets also are placed on the top or sides of the core to prevent it from rising or otherwise shifting position when subjected to the pressure of the molten metal. The thickness or height of the chaplet corresponds to the desired thickness of metal in the area (Fig. 1C).

Metal patterns are resorted to for four reasons—durability, duplication from the original, rapid production in large quantities, accuracy and fine finish. Many parts are so designed that thin or otherwise delicate projections never would stand up if wood were used. Projections may be flanges, ears, lugs or bosses that stand out in exposed positions and would break through sand pressure or from contact with the molder's rammer. The parts should be metal, either ferrous or nonferrous. Common material is white metal which is easily worked, is reasonably hard, fairly corrosion resistant and has minimum shrinkage—about 1/32-in. per foot. It has the advantage of being suitable for duplication from the original pattern. A special master pattern is not required unless 1/32-in. shrinkage is a limiting factor in the anticipated casting dimensions.

The metal patternmaker usually can melt his own metal and do the molding from the original or master pattern. Other metals used extensively for patterns or pattern parts include brass, aluminum and cast iron. Since the majority of metal patterns are comparatively small, two or more can be mounted or "ganged"

(*Concluded on page 244*)

INTERNATIONAL TYPE PKL MACHINE



Made with 12" and 14" Diameter SQUEEZE CYLINDER

INTERNATIONAL MOLD

LA GRANGE

INTERNATIONAL TYPE PKL MACHINE

JOLT, SQUEEZE, AIR PIN LIFT

This machine is of a very rugged character. The column, squeeze head and platen are made of cast steel. The squeeze cylinder, squeeze piston, jar cylinder and jar table are made of wear-resisting iron.

All parts subject to wear have replaceable bushings of either brass or hardened steel. There is a threaded adjustment on the lower ends of the lift posts so that they can be set at the right height to suit the thickness of the pattern plates to be mounted, and the centers of the lift posts can be readily set to suit the sizes of flasks to be used,—note specifications on the following page. Type PKL comes equipped with pop valves, air gauge, vibrator and cleaner valve.

LDG MACHINE COMPANY

GERK, ILLINOIS

(*Concluded from page 241*)

on one plate and matched. This feature will be taken up later.

The metal patternmaker can make any desired number of duplicate patterns from the original or master pattern. The original pattern may have been used to make the initial castings to be used later in production. This set of castings may be regarded as samples and is critically checked by the inspector. Following approval of the samples, the metal patternmaker provides suitable equipment for quantity production. This practice applies only when the shrinkage is of little or no consequence. With aluminum, which shrinks about ¼-in. per foot, and in cases where shrinkage is a vital factor, a master pattern is produced first. It is not intended for production, but is made especially for the metal patternmaker to produce the working pattern or patterns in the required size and material.

A master pattern can be made from almost any material. In most instances wood is employed. For certain classes of work clay or plaster is favored. Plaster is used when a required form would necessitate extensive and intricate carving in wood. Plaster is extensively employed in architectural design patterns, center pieces, plaques and ornamental casting patterns. In the 80's and 90's of the past century plaster was employed freely for ornate stove plate patterns.

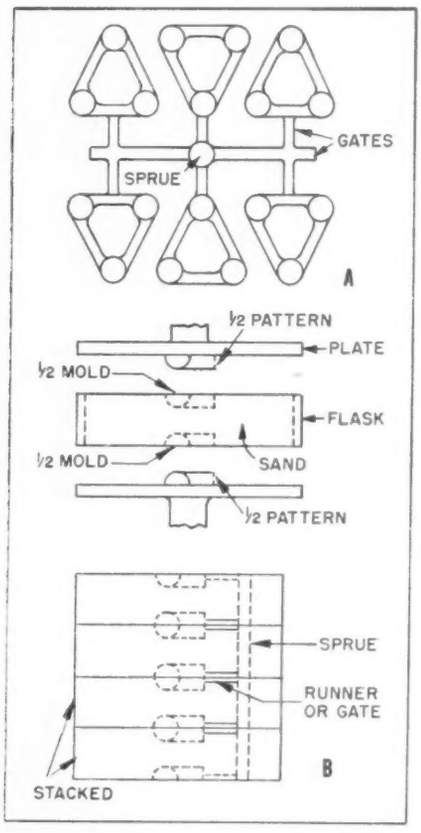


Fig. 2 A—Patterns matched and gated to form a multiple mold. Fig. 2 B—Stacked molds with half mold impression in drag and half in cope

After the original or master pattern is made, the required number of working patterns are cast, finished and then matched or gated to form a multiple mold, Fig. 2A. In one variation of multiple molding two mold impressions are formed simultaneously, one in the cope and one in the drag, Fig. 2B.

When several patterns are designed to be molded as a group in a single flask, the parts forming the connections serve as gates, hence the term "gated patterns." This type of pattern is mounted temporarily in a sand or plaster mold board or oddside. In a second and better method, patterns and gates form an integral part of the matchplate. The joint or plate surface need not necessarily be flat in the vicinity of the patterns. The plate joint coincides with the joint line of the pattern or patterns. Because of their light weight, aluminum and magnesium are the most suitable materials for this type of pattern equipment.

Molding — Most power-operated molding machines are actuated by compressed air. The flask on the table is filled with sand, usually through a chute from an overhead hopper. A ram or squeezer brought into contact with the sand rams or squeezes the sand uniformly around the pattern. It is readily apparent that this uniformity is an important feature in machine molding practice. After the sand is squeezed down the ram is released automatically and an air-operated vibrator loosens the pattern. The drag is lifted from the machine table, turned over and placed on the floor or on a conveyor line. The cope is lifted from the table and placed directly on the drag. With the aid of a molding machine a man makes approximately ten times the number of molds formerly made by hand.

Bench molding is done by hand and is resorted to when production in quantities is not required. Patterns may be one piece, split or mounted on plates. Where small pieces and comparatively few castings are required, bench molding serves a useful purpose. The bench molder necessarily is a skilled mechanic and usually handles a variety of castings in the daily routine.

If patterns and equipment are too heavy for machine or bench molding, they are molded in or on the floor. Medium and fair size matched patterns are used extensively in floor molding. The pattern is adjusted on the board or plate by pins and center lines. The flask settles into place in a similar manner, guided by pin holes in the ends or sides. This arrangement enables the molder to make up his molds much more accurately and rapidly than in instances where the patterns are not matched. Special attention should be given simplicity of design in patterns destined for long continuous production.

Whenever possible the design should facilitate easy and perfect removal of the pattern from the mold. Overhanging parts or projections should be avoided. Lugs or bosses on the vertical face should be extended, if possible, to the pattern joint, so that it will not be necessary for the molder to reach in and pick them out with a wood screw or a sharp spike or vent wire. Projections of this kind retard production and call for a considerable degree of skill on the part of the molder. Also they constitute a shifting hazard.

To overcome this difficulty the patternmaker sometimes places a tail print under the projecting member down to the pattern joint. This practice makes the molder's work easier and reduces the hazard. However, it means making cores and setting them in the mold. In some cases the designer has no option. It may be absolutely necessary to have these overhanging pieces on the pattern. In some instances a little extra study and effort has resulted in a modification of an original design to eliminate difficult and hazardous features, and thus reduce the cost of making the casting.

(*To be continued next month*)

Booklet Offers Ideas on Improving Worker Skills

Bureau of Apprenticeship, U. S. Department of Labor, has published a 16-page, illustrated booklet containing ideas and suggestions for broadening the skills of the nation's work force. The booklet, "Your Skill Improvement Program," emphasizes the importance of developing training programs to meet specific needs, sets forth ideas and suggestions for organization and operation of skill improvement programs, and provides a checklist enabling an employer to make a spot evaluation of his current training program.

Copies may be obtained from the Publications Branch, Bureau of Apprenticeship, U. S. Department of Labor, Washington 25, D. C.

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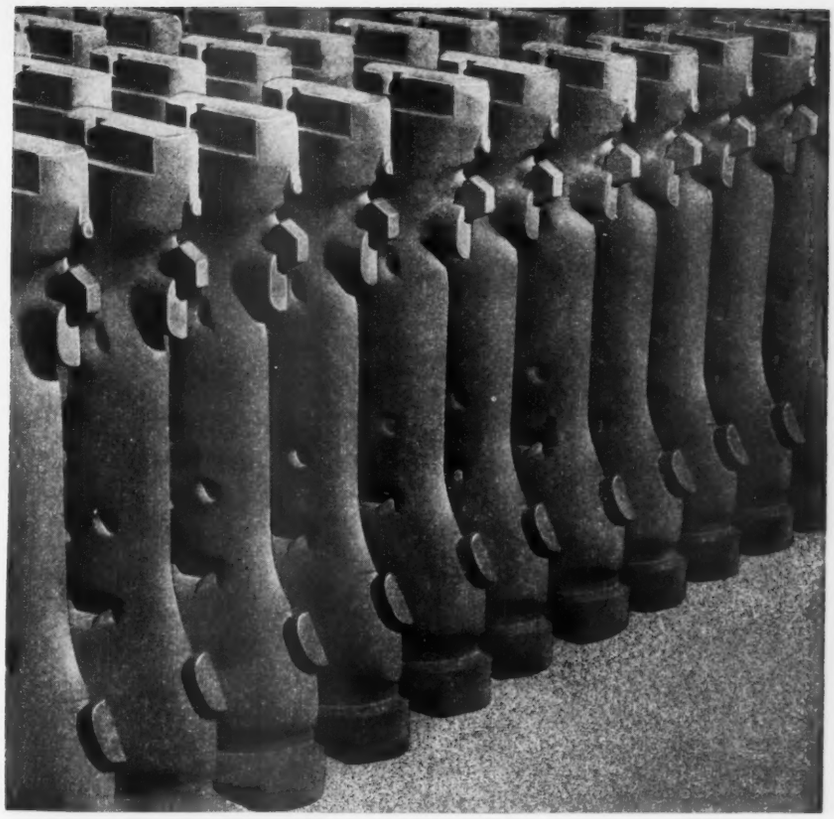

Monsanto supplies both phenolic and urea resins for core binders. These large cores were bonded with RESINOX* phenolic resin.

For close to ten years, Monsanto has pioneered the development of special foundry resins for core binders and shell molding. From hundreds of formulations tested in a well-equipped foundry laboratory, several outstanding resins have been developed and refined for the special needs of foundry work. Among these are Monsanto's

RESINOX phenolic resins	in powder form	for shell molding
RESINOX phenolic resins	in liquid form	for core binders
RESIMENE* urea resins	in powder form	for core binders

Another exclusive Monsanto development is a dust suppressant for shell molding. While not an essential element of the shell molding technique, Dust Suppressant A has been found to contribute significant benefits to the many foundries now working with shell molding.

GET THE COMPLETE STORY ON SHELL MOLDING

Detailed, factual, complete . . . this new manual answers all your questions about shell molding. Fully illustrated with pictures and description of the process, materials and equipment needed, sand evaluation, and other practical discussions to answer your questions about this new method of casting metal. Monsanto will be glad to send you a copy without obligation. Just mail the handy coupon.

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☐ Please send me data on Monsanto's foundry resins. (Please give details about the type of work you are considering.)

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Industry BRIEFS

NATIONAL LEAD CO., 111 Broadway, New York 6, has formed Pioneer Alloy Products Division to take over manufacturing operations of Pioneer Alloy Products Co. Inc. of Cleveland. The new division's foundry and machine shop is at Ellwood City, Pa. Production will consist of corrosion-resistant valves, heat and acid resistant castings for general industrial use and chrome-nickel-steel valves now manutured at National Lead's Fitchburg, Mass., plant. L. J. Grabow, general manager of Pioneer Alloy Products Co. Inc. is sales manager of the new division.

* * *

Syntron Birmingham Sales Co. has opened new offices at 1831 29th Ave. S., Birmingham 9. Sales operations are directed by A. H. Brush, recently associated with Syntron Baltimore Sales Co. The organization handles the complete line of equipment manufactured by Syntron Co., Homer City, Pa.

* * *

Griffin Wheel Co., 410 N. Michigan Ave., Chicago 11, which is a subsidiary of American Steel Foundries, is planning construction of a railroad wheel foundry at St. Hyacinthe, Que. To be known as Griffin Steel Foundries Ltd., the new company is expected to begin operations in the summer of 1953. It will produce wheels of low-carbon steel, formed in graphite molds.

* * *

Vanadium Corp. of America recently began production of ferrosilicon in its new $8 million plant near New Haven, W. Va. The plant includes five electric arc furnaces, 22 to 25 ft in diam, with overall rated capacity of 50,000 kw.

* * *

Ohio Tramrail Division of Forker Corp., 2044 Random Rd., Cleveland 6, has appointed Barton Sales Co., Ft. Wayne, Ind.; Hugh Boyd, Mansfield, O.; and Tedd Harris Co., North Tonawanda, N. Y., to be its representatives.

* * *

Pink Pattern & Foundry Corp., Rochester, N. Y., has been granted a charter of incorporation with capital stock of $125,000. Directors are Willard M. Salter, 1625 East Ave., and George and William Pink, Genesee Park Blvd., all of Rochester.

* * *

Hooker Electrochemical Co., Niagara Falls, N. Y., has formed a new subsidiary, Hooker Chemical Ltd., a British Columbia corporation, which is acquiring a plant site of approximately 60 acres on Burrard Inlet in the district of North Vancouver, B. C. Officers of the subsidiary will be: R. L. Murray, president; B. Klaussen, vice president; A. Wilcox II, secretary; and D. A. Riordan, treasurer. These men are all executives of the parent company.

* * *

Hewitt-Robins Inc., 666 Glenbrook Rd., Stamford, Conn., has opened new sales, engineering and warehouse headquarters at 2533 Malt Ave., Los Angeles, and at 5711 Navigation Blvd., Houston, Tex. G. V. Migula is manager of the western division at Los Angeles, assisted by District Managers Marion D. Austin and James E. Van Stone. L. C. Holloman is manager of the south central division, John W. Pew the district manager.

* * *

Cleco Division, Reed Roller Bit Co., Mack St. & Avenue Q, Houston, Tex., has appointed the following distributors: Anna M. Fusco and S. L. Fusco, 4937 East Olympic Blvd., Los Angeles 22; Pauli & Griffin Co., 509 Sixth St., San Francisco; William J. Boss Co., Glens Falls, N. Y., and Bison Machinery & Tool Co., 709 Seneca St., Buffalo 10. Cleco manufactures the Cleco and Dallett lines of air tools and accessories.

* * *

Macklin Co., Jackson, Mich., has incorporated two new wholly owned subsidiaries—Macklin Sales Co. and Macklin Abrasive Co. The former will handle all sales of grinding wheels and other abrasive products. Macklin Abrasive Co. will manufacture and sell abrasives.

* * *

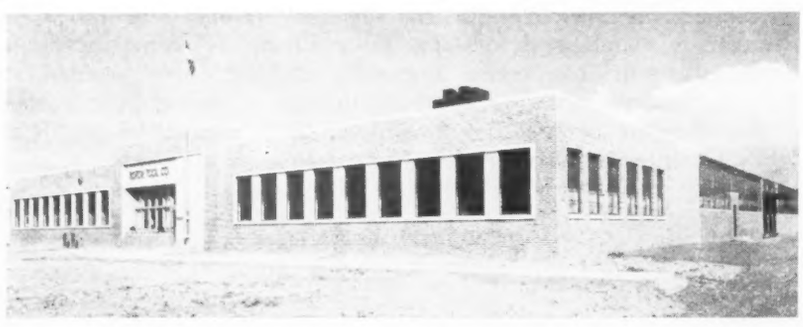
Independent Foundry Supply Co., 6463 East Canning St., Los Angeles, has been appointed a distributor for the Macklin Co.'s grinding wheels and abrasive products. Thomas Clifton will supervise abrasive sales. Union hardware & Metal Co. also will continue as a Macklin distributor.

* * *

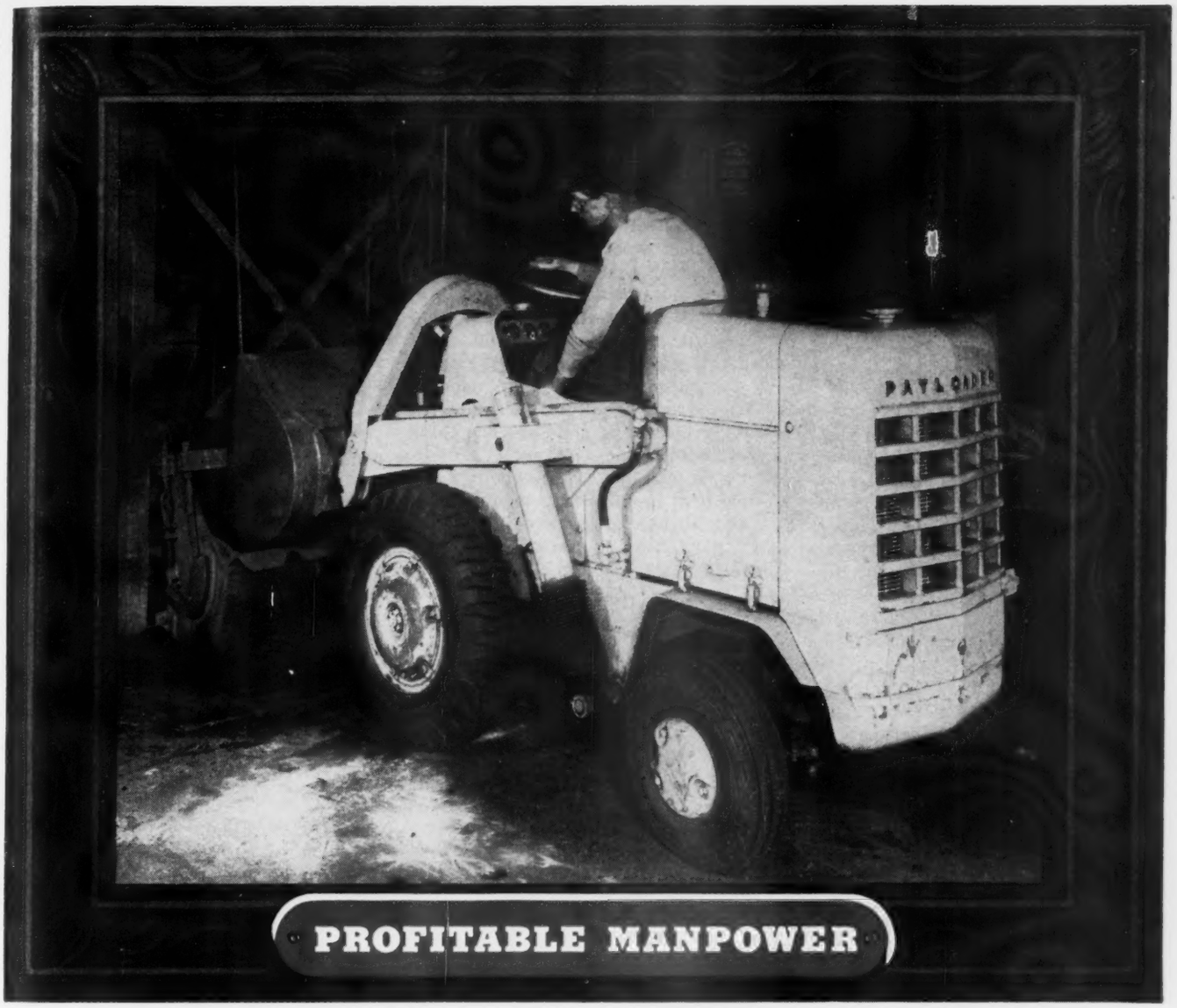
Lindberg Engineering Co., 2450 West Hubbard St., Chicago 12, has purchased 4½ acres of land in Los Angeles on which it plans to build offices and a plant for the production of all types of heat treating and melting furnaces manufactured by the firm.

* * *

Ampco Metal Inc., 1745 South 38th St., Milwaukee 4, plans a 3200-sq-ft addition to its plant at 30 East Burbank Blvd., Burbank, Calif. Essentially a foundry operation, it also serves as a West coast warehouse center.



DEDICATE NEW PLANT ON 25TH ANNIVERSARY: Rotor Tool Co., 26300 Lakeland Blvd., Cleveland 23, celebrated its 25th anniversary recently by dedicating a new, ultramodern plant and offices for the manufacture of grinders, sanders, buffers and other portable air and electric tools. The entire plant is air conditioned



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This man may have been good with a wheelbarrow and hand shovel, but his production is several times greater as a "PAYLOADER" pilot. He's happier and so is his boss because they both make more money.

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"PAYLOADERS" are available in seven sizes, from 12 cu. ft. to 1½ cu. yd., to master your jobs both indoors and outdoors. Get full facts *now* on cost-cutting, time-saving, production-boosting "PAYLOADER." The Frank G. Hough Co., 703 Sunnyside Ave., Libertyville, Ill.

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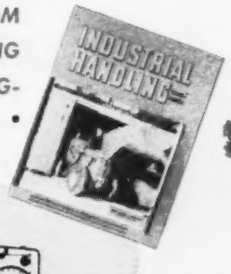

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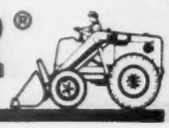


Adventures of BILL

By PAT DWYER

Illustrations by RICHEY

BILL popped in the other night while I was peacefully working my way through the pages of the evening newspaper. My eye had just lighted on the headline "Business Outlook For Coming Year." I silently gestured Bill to take a seat, take the load off his big flat feet, and take a reef in his taw tackle until I finished reading the inspired peek into the future.

After a nasty look over my shoulder, Bill solemnly assured me I was wasting my time. Furthermore, he claimed he could do a better job of prognosticating with nothing but a deck of cards and a small mess of tea leaves.

"At the close of any given year," he said, "you will find that too many of these business forecasts were based on single statements, on groups of unrelated statements, on sour masses of undigested statistics relating to wheat and steel and cotton; to the oil situation, and to the number of Mujiks to the square mile in Russia. Oracular opinions are expressed by heavy-voiced gentlemen who could not tell you, if backed into a corner, whether wheat is a nut or a berry; whether steel is a product woven from steel wool in the steel mills, or a metal that is lifted by huge buckets out of a blast furnace. Oil is just oil and when a gusher is mentioned it might just as well spout banana oil as petroleum. Owing to a subsidized Russian press, depreciated currency, the total failure of the hay crop in Peru and—er—one thing and another, the speaker of the evening is not just sure whether the statement he intends to quote is: 'So many Mujiks to the square mile' or 'so many miles to the square Mujik.'

"Just throw your mind back about twenty years to a somewhat similar period, when all the papers were filled with high-octane ballyhoo. Then the technocratic fox broke out of his Columbia mountain covert and the entire pack of news beagles, with the unerring nose for a new scent, trailed away in full cry. I soon discovered I was not able to keep up. Some of the words in these technocratical stories have been dredged from fathomless deeps in the dictionary—virgin territory, never disturbed since Webster took the words and, like little Boy Blue, kissed them and placed them there. The years have been many, the years have been long—har, har says you—almost as long as some of the words!

"Other words with which I am more or less familiar, just the common run of mine stuff, or, to change the metaphor, words seined from near the surface of the sea of language, have been grouped in such fearful and wonderful combinations, they convey no meaning to my mind. Maybe I am just plain dumb, but there it is. That's my story and I am going to stick to it. The technocracy stories are too deep, or too high—suit yourself—for me. So why should I waste my time reading 'em?

"Figures are juggled around in a manner never approached by even the most accomplished and expert business statisticians, and you know how these lads can throw them around. Any point they wish to illustrate, or any fact that needs or seems to need a few figures to back it up, why, these birds can fish 'em up as readily as a stage magician can bring rabbits, popcorn, oranges, pigeons, pineapples, prunes, guinea pigs and huge bouquets out of an apparently empty high silk hat.

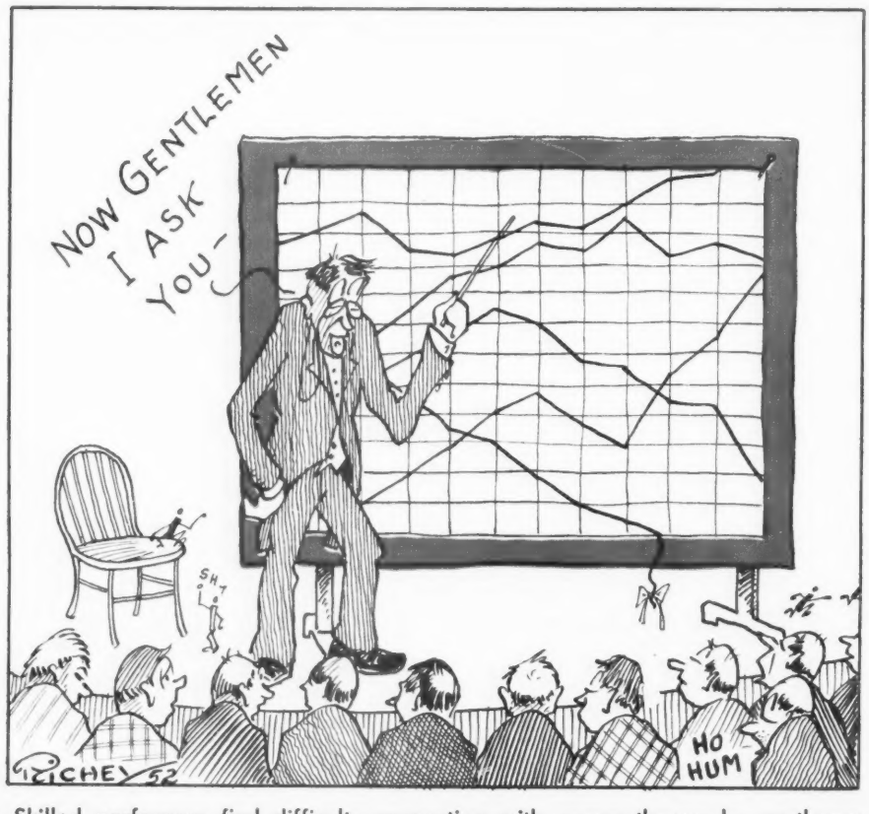
"Other figures which, if quoted or otherwise placed on display, might cause them embarrassment, are suppressed, ignored, or made to disappear with the same magical celerity. The quickness of the hand deceives the eye. You are allowed to see just exactly as little or as much as the performer desires you to see."

"I think you are doing these men a grave injustice," I said. "Presumably they get their figures from official sources of some kind. Take for example, the output of boots and shoes in the United States in 1800—"

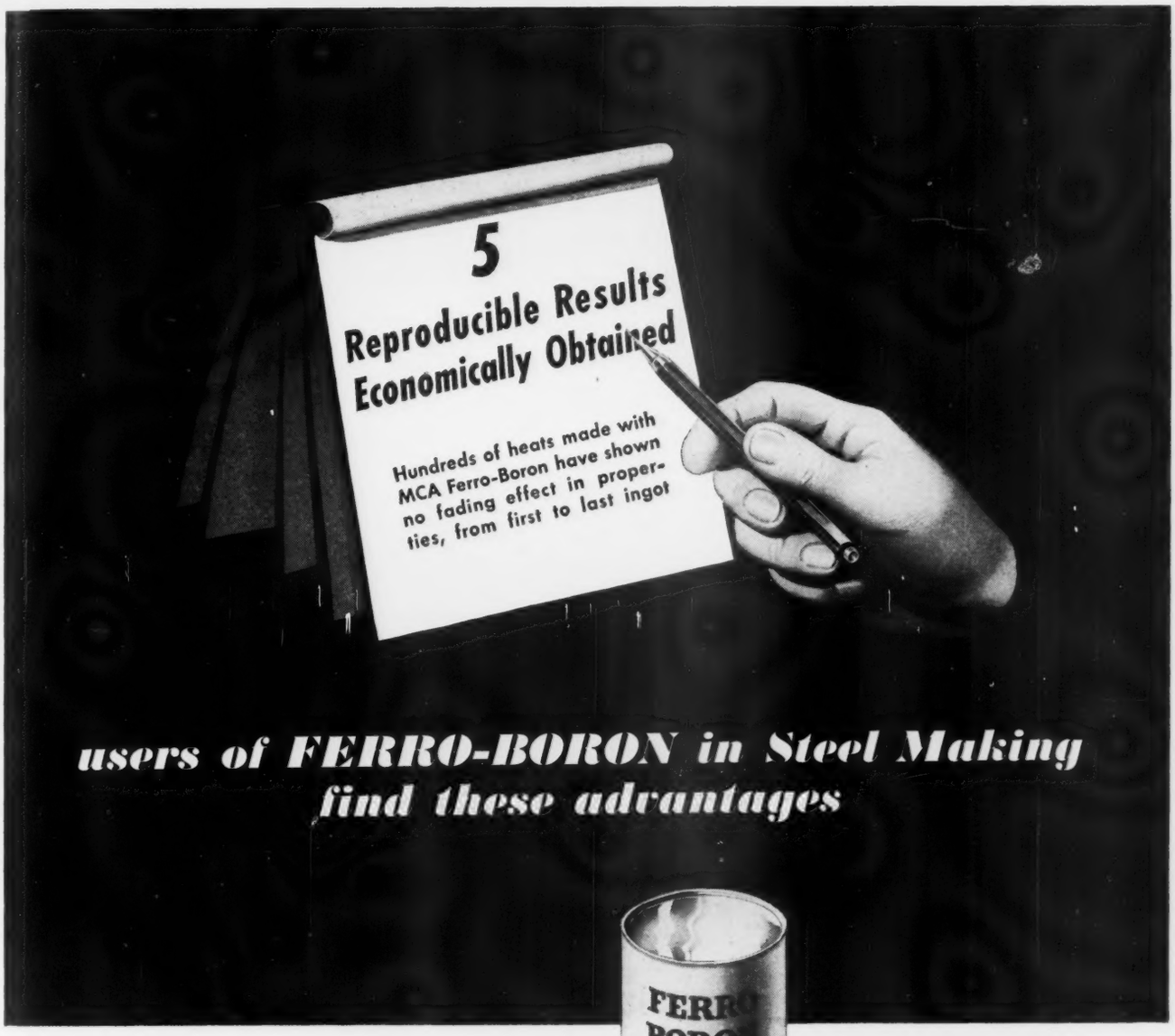
"All right," Bill agreed heartily, "take the year 1800 when the population of this country was a little over 5,000,000. With this figure for a foundation and the further fact gleaned from ancient records that a skilled shoemaker could turn out a pair of shoes per day, the technocratic spellbinder divides the 5,000,000 pairs of shoes needed annually by the 300 working days and arrives at the astonishing conclusion that 16,666 shoemakers found employment at that period. Having established that point he applies the same set of figures to the present output of shoes and proves that the machine has thrown several million men out of work.

"The fallacy of the argument is that it presents certain plausible factors and ignores others. At the period selected for illustration it is quite probable that 25 per cent of the

(*Continued on page* 250)



Skilled performers find difficulty connecting with curves thrown by southpaw


5
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—5— Reproducible Results, Economically Obtained

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Grant Building Pittsburgh, Pa.

MCA

(*Continued from page* 248)

population walked barefoot part or all the time. Another 25 per cent wore moccasins or other homemade footwear. Instances are on record of stout cowhide shoes, regularly greased with tallow, that served their owners for four or five years. Certainly it is reasonable to infer a considerable volume of footgear was imported from Europe.

"Now my lad if 16,666 (the last 6 is a repeater) shoemakers were required in 1800 to make 10 per cent of the shoes required by 5,000,000 people, how many men would be required under similar conditions to make the shoes—from 2 to 12 pairs—in the present year 1952 for 150,000,000 people? Every second man in the country would be bent over a shoemaker's bench. Who would be left to fill the roles of the butcher, the baker, the candlestick maker?"

"That is an exaggerated example," I claimed. "You can't play tricks with ordinary figures in that manner. Two and two still make four."

"Two and two might make four in your hands," Bill said, "but in the hands of an expert word juggler, two and two could appear as 22. If you place one 2 above the other in the old gazinta formula, the answer is 1. Take another familiar example: The consensus among those who have compared notes on the subject is that the immense population of the world is descended from one original pair, Adam and Eve. They are known under different names by different nationalities, but the general belief is the same.

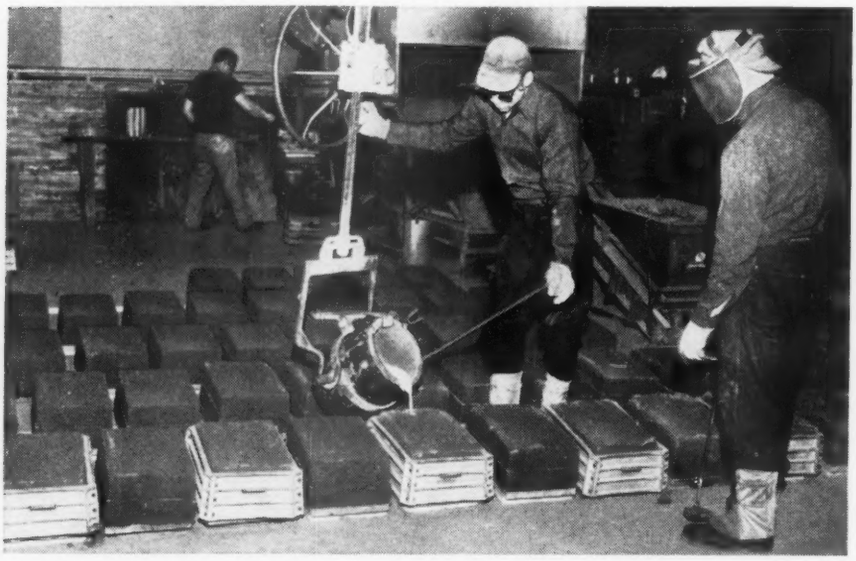
"A clever figurer can reverse this pyramid by directing your attention to the fact that while you have only one father and one mother, you have two grandmothers and two grandfathers. In turn, each of these had two ancestors and so on into infinity. By carrying back the calculation for a few thousand years you can prove you had more ancestors than Adam and Eve had descendants. All this talk of figuring reminds me of an inquiry from a foundryman who was faced with the problem of doubling his present daily output of castings."

The problem of increasing production is subject to many solutions, including that of providing additional floor space. Occasionally the problem is solved by running a day and night shift. Since the problem rarely is exactly alike in any two instances, the foundryman has to consider the problem from many angles and eventually adopt a compromise. For example, consider a foundry producing agricultural implements where the plow point molds are stacked six high and where all the available floor space is covered with molds every day. The molds are made on molding machines which straddle the sand heaps and thus travel across the shop from the wall to the gangway on the opposite side. An avalanche of orders involving doubling the usual daily output presents a peculiar problem in that hot sand cannot be used. Heat will precipitate a deposit of moisture on the chills in the molds.

Under ordinary conditions hot sand offers no particularly objectionable features so far as its suitability for molding purpose is concerned. In this particular instance the heat will cause moisture to condense on the chills with resulting blowholes in the castings. However, this is an exceptional instance. In the long established routine, and this of course applies to the majority of foundries, the castings are shaken out in the late afternoon, the sand is wet down and cut over at night and thus is cooled and in condition for the molders on the following morning.

To meet the problem outlined in the opening paragraph, several alter-

(*Continued on page* 252)



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Foundrymen successfully pouring bronzes should not overlook the advantages of BERYLCO beryllium copper. Here's one metal you don't have to baby.

Molding practice for beryllium is similar to that of bronze. Natural molding sands give good results. Shrinkage is comparable to that of the tin bronzes—slightly less than that of manganese or aluminum bronzes. Gating techniques for beryllium copper are readily adapted to your current practice, and all types of melting furnaces have given satisfactory results.

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A number of standard alloys are available. Each offers a different combination of desirable properties. Depending on the alloy selected, it is possible to obtain tensile strength to 180,000 psi, hardness to 450 Brinell, or electrical conductivity 50 percent that of pure copper.

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BERYLCO ALLOYS ARE AVAILABLE IN 5 LB., 2½ LB. AND 3 OZ. INGOTS

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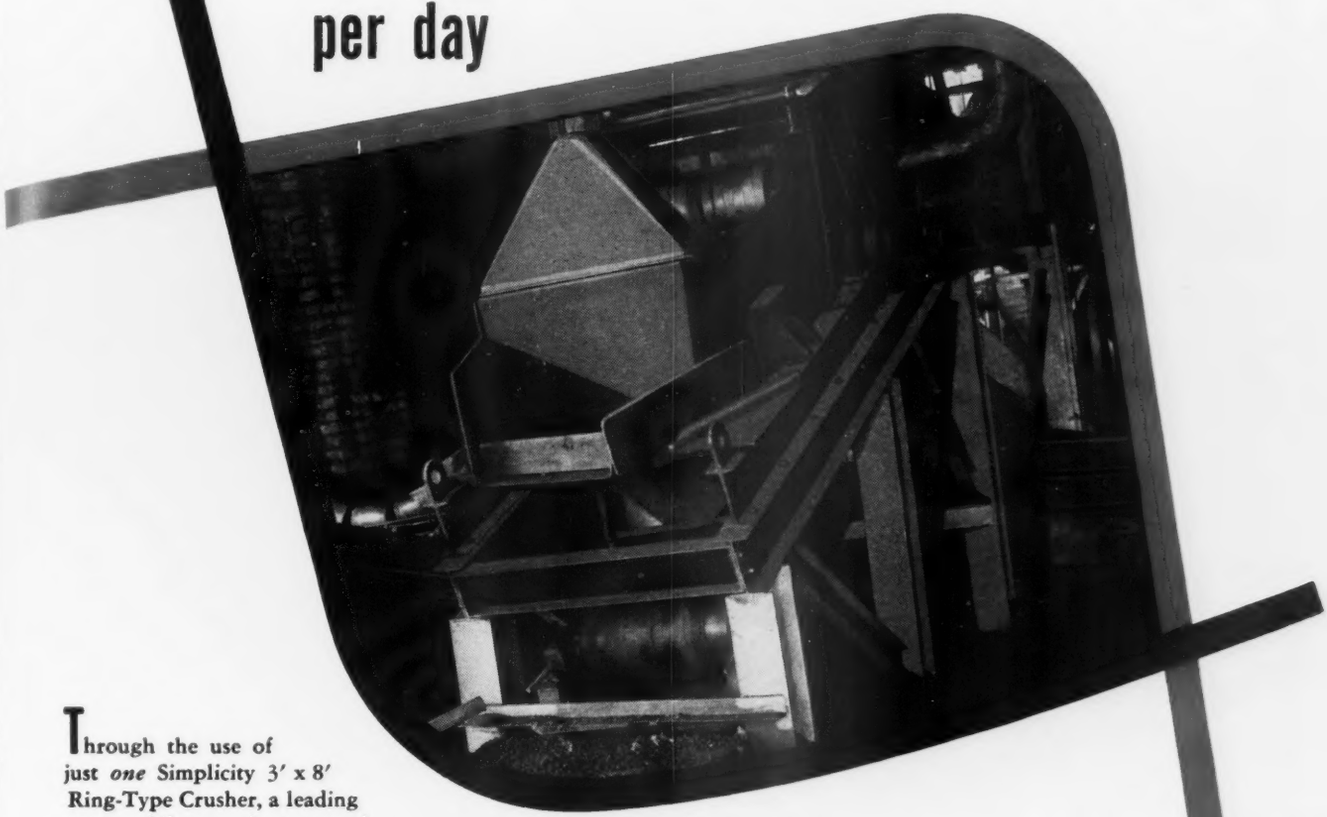
Representatives in principal world-trade centers

simplicity 3′ x 8′ ring-type crusher recovers about 400 tons of sand per day



Through the use of just *one* Simplicity 3′ x 8′ Ring-Type Crusher, a leading automobile manufacturer realizes savings of about 400 tons of sand daily in grey-iron foundry operations. In this installation, lumps of sand, especially those from cores that do not break up in shakeouts or screening, are fed to the Simplicity Crushing Screen instead of being hauled to the dump, as is the practice in many foundries. The recovered sand is returned by conveyor to sand storage and mulling equipment thus making appreciable savings in new sand requirements as well as eliminating the cost of hauling away sand lumps. With a Simplicity, one unit does both crushing and screening. It gives positive crushing action and maximum production of grain-size sand. Simplicity Crushers are available with either one, two, or three sets of rings, depending on the lump size to be crushed.

Simplicity Crushing Screens are in profitable operation today in foundries producing magnesium, aluminum, steel, malleable iron, and grey iron castings . . . why not put one to work in your foundry?

A Simplicity sales engineer will be glad to give you the full story. Write us.

103

Sales representatives in all parts of the U. S. A.

FOR CANADA: Canadian Bridge Engineering Company, Ltd., Walkerville, Ontario

FOR EXPORT: Brown and Sites, 50 Church Street, New York 7, N. Y.

Simplicity
TRADE MARK REGISTERED

ENGINEERING CO. • DURAND, MICHIGAN

NEED A* Well-Made PATTERN?

Complicated Well-Made pattern for large automotive use.

Well-made pattern for military use.

One corner of our well-equipped Pattern Plant.

It's simple if you do. Just specify a *Well-Made. Almost a half century of experience on wood and metal.

*Copyrighted Trade Name

The WELLMAN Bronze & Aluminum Co.

DEPT. 7, 12800 SHAKER BLVD.
CLEVELAND 20, OHIO

(*Continued from page* 250)

native methods for securing a constant supply of cold sand are presented as a basis for drawing conclusions. 1—Reline the cupola to reduce the melting speed and then pour the metal continuously instead of pouring the entire amount during an hour or two at the close of the day. Shake out each batch of castings immediately after they are poured and wet down the sand. At noon and at midnight cut over all the available sand, approximately 65 per cent. This amount will stand for 6 to 8 hours and will be ready for the next shift to start on. The remainder can be cut over after the remaining molds on the floor are shaken out and will be cooled before the second shift arrives at that part of the heap. The main objection, of course, to this plan is that it will involve a rearrangement of existing labor gangs.

2.—Extend the foundry building to twice the present length or width and provide separate floors for the day and night gangs, either side by side or end to end, so that a single monorail will serve for pouring metal on the two floors.

3.—Install an extensive sand handling plant at one end of the building, with roller conveyors between adjacent floors, extending from the walls to the center of the building. Work the double shift by day instead of one shift by day and one shift by night. Thus if 40 men need the entire floor space at present to accommodate the daily production, working in the usual manner from one side of the shop to the other side, 80 men could be placed on the same floor space by working 40 men from each side to the center. This plan, of course, involves continuous pouring and shaking out to prevent crowding or overloading the conveyors.

With conveyors to carry away the molds, the necessity no longer exists for the molding machines to straddle or follow the sand heaps. The day's supply of sand can be piled close to the wall and the machines parked in the immediate vicinity. As fast as the molds are poured they are dumped from the ends of the conveyor lines onto a grating in the central gangway. Castings and sand are retrieved. Castings are taken to the cleaning room. Flasks are returned to the vicinity of the molding machines. The sand is carried on a belt below the grating to a sand conditioning plant at one end of the foundry.

Here the stream of sand may be divided to fill storage tanks on each side of the shop, one for each line of

(*Concluded on page* 254)

Stronger

FREMONT MAGNESIUM FLASKS

assure longer service . . . magnesium
having twice the strength of aluminum.
Easier handling
also follows the fact that magnesium
weighs ⅓ less than aluminum.
Accurately machined
inside surfaces and flanges, and steel-faced
top and bottom flanges
make possible far more exacting work.

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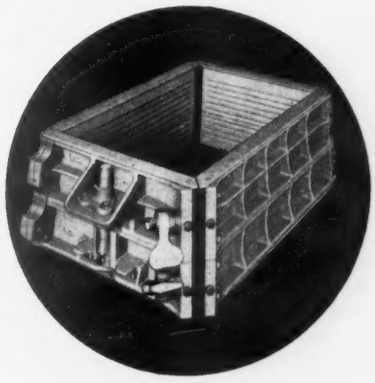
The New

FREMONT SPREADLOCK FLASK
FREMONT STANDARD SLIP FLASKS
FREMONT CAST IRON
OR CAST ALUMINUM JACKETS



The FREMONT FLASK CO.
FREMONT, OHIO

"Where canvas gloves lasted 3 to 4 days, Edmonts wear 3 to 4 weeks"

— Homer Foundry Corp.

Many well managed plants, like Homer Foundry Corporation at Coldwater, Michigan, have greatly reduced the cost of supplying gloves to workmen by standardizing on modern fabric gloves with tough natural rubber or NEOX coated palms. Workmen find these cloth-backed gloves more comfortable than "dipped" gloves and more suitable for hot castings than plastic gloves which tend to melt with heat.

Long-wearing natural rubber coated glove used at Homer Foundry . . . .

NEOX (Reinforced Neoprene) Coated Gloves Best Resist Combined Cutting and Abrasive Wear, Oils, Chemicals and Heat . . . .

For core-making and the grinding, polishing and handling of castings, NEOX coated gloves far outwear leather, canvas or ordinary neoprene, are unusually flexible and comfortable. For molding, core removal, sand blasting and general yard work, natural rubber and new type plastic coatings are also widely used.

Job-Fitted Gloves Pay Dividends to Management in fewer lost-time accidents, faster work handling, less spoilage, better employee attitude and 40% to 70% average savings in glove costs. As world's largest maker of coated industrial gloves we will recommend the type that best fits your application.

Free Test Offer: Send brief description (on business letterhead) of your operations, materials handled and temperature condition. Without cost we will supply samples of the correct gloves for testing on-the-job.

Edmont Edmont Manufacturing Company
1274 Walnut Street, Coshocton, Ohio
job-fitted gloves

(*Concluded from page* 252)

molding machines. Some time between midnight and morning the cooled and rejuvenated sand is released from the storage tanks and discharged over a moving belt provided with plows which deposit a designated amount close to the wall at the end of each floor.

This arrangement involves shoveling the sand into the flasks as at present. Under a slightly more elaborate arrangement sand may be delivered into a row of hoppers over each row of molding machines. Each hopper is equipped with a measuring chamber and gate at the lower end. To fill the flask with sand the molder pulls a rod which opens the gate. The required amount of sand falls into the flask.

Magnesium Association To Meet in New York

The Magnesium Association will hold its eighth annual meeting, Nov. 10-11, at Hotel Biltmore, New York. Open to the public, the program will include casting, technical and general sessions and two luncheons.

On Nov. 10 the luncheon speaker will be L. C. Mallet, assistant general manager, Pratt & Whitney Aircraft Division, United Aircraft Corp., who will discuss "Air Power's Metal Faucet." On the second day the luncheon speaker will be C. A. Campbell, vice president and general counsel, Dow Chemical Co., whose subject will be "Freedom Is Not Enough."

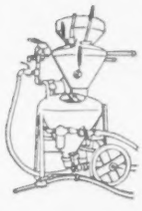
The castings session program Nov. 10 includes:

1. "Grain Refining of Magnesium Alloys," R. T. Wood, Aluminum Co. of America
2. Panel—"New Developments in Magnesium Castings"
   a. "Large Radar Sand Castings" —Elmer Lanfrancke, Rolle Mfg. Co.
   b. "Investment Castings"—P. L. Butler, Arwood Precision Castings
   c. "A Cast Aircraft Wing"—Ward Stewart, Aluminum Co. of America
   d. "Thin Walled Airframe Castings"—Ray Osbrink, Osbrink Mfg. Co.
   e. "Shell Mold Castings"—A. J. Marotta, Utica Radiator Corp.

Other technical sessions are scheduled for the afternoon of Nov. 10 and the morning of Nov. 11. The general session will be the afternoon of Nov. 11.

Advance registration forms may be obtained from the Magnesium Association, 122 East 42nd St., New York 17.

Cupoline for your Cupolas...



Cupoline Bondact Mix is proportioned for use in the Bondact machine. This combination makes contour patching simple, ends uncertainties of hand mixes, avoids joints and weak points. Moisture is easily controlled.

PUT CUPOLINE TO WORK WITH THE BONDACT MACHINE

Cupola patching with the BONDACT machine using Cupoline refractory is a continuous story of substantial savings. Smaller cupolas can be patched in as little as 10 minutes and the average cupola in less than 30 minutes.

Save yourself many cupola headaches. Get actual case histories of money-making conversion to the Bondact air placement method of patching cupolas. . . Better service than ever from three shipping points.

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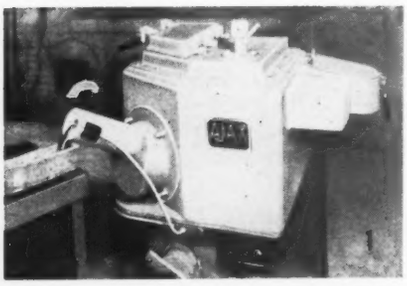
REVIVO BOND • BONDACTOR • CUPOLINE • DURA PRODUCTS • WESTONITE

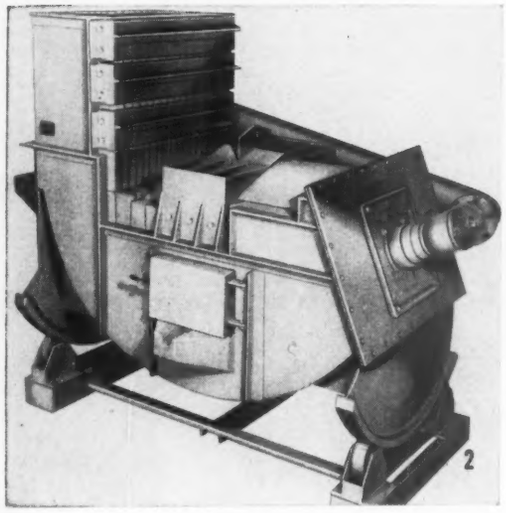
New EQUIPMENT and Supplies

For Additional Information on these Items Use Reply Card —Page 259



(1)—Pouring Unit: Ajax Engineering Corp., Trenton, N. J.—Automatic pouring unit discharges measured amounts of molten aluminum directly into the cold chamber of most available die casting machines. So that no surface oxides or scum are poured into castings, the metal is taken from below the surface of the melt. The unit acts as a combined electrically heated holding furnace and automatic pouring unit, but not as a melting furnace. It must be supplied with molten aluminum at regular intervals. Weight of the castings, normally from ½ to 5 lb, but up to 20 lb with slight modifications, is selected on a dial and is automatic afterward. Controls can be linked to automatic controls on the die casting machine. Practically inert refractory materials are used throughout, and the molten aluminum does not contact metal or moving parts. The machine can be used with zinc alloys, too.

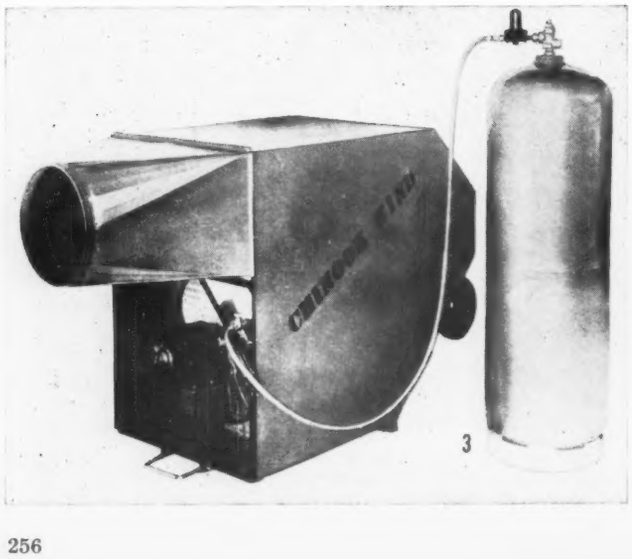
For More Details Circle No. 1—Page 259



(2)—Furnace: Eclipse Fuel Engineering Co., 1002 Buchanan St., Rockford, Ill.—Noncrucible, direct-fired reverberatory furnace permits continuous charge and continuous pour operation. Hot metal always is available for casting. Combustion is used for melting or for preheating cold metal in the hopper, which has a restricted opening in the bottom to prevent cold metal from contacting molten metal. Quick melting cuts down gas absorption, too. Fired by oil or gas and equally efficient for large or small heats, it can be built to meet specified requirements. Standard models have bath capacities from 300 to 4400 lb.

For More Details Circle No. 2—Page 259

(3)—Portable Heater: International Mfg. Co., 2249 South Delaware St., Denver—Portable heater and dryer which uses propane or butane gas provides instant, on-the-spot, economical heat. Free from smoke, soot, fumes and carbon monoxide, it may be used either inside or outside. It measures 2 x 3 x 4 ft, weighs 150 lb and is easily moved on semipneumatic rubber-tired wheels with ball bearings. The heating unit, a cast iron torch with motor-driven fan which delivers a maximum 3500 cfm at 250°F, has a top capacity of 500,-



000 Btu. A smaller model with capacity of 500 cfm at 250°F delivers 100,000 Btu, is 18 x 23 x 11 in. and weighs 35 lb. Flexible flameproofed and waterproofed canvas ducts 12 in. diam are available in 12 and 24 ft lengths, reinforced, to carry heat to the exact spot where needed.

For More Details Circle No. 3—Page 259

(4)—Diesel Trucks: Towmotor Corp., 1226 E. 152nd St., Cleveland 10—Four models of fork lift trucks from the company's line now are available with diesel or gasoline engines. They are the LT-62, LT-60, 460 and 480-P. Manufacturer says that the diesel engine develops unusual power for its size and weight, operates with exceptional economy and assures minimum servicing problems because of its simplified design.

For More Details Circle No. 4—Page 259

Electrodes: Stoody Co., Whittier, Calif. — Moly-manganese electrodes contain 14 to 15 per cent manganese, and desposits show full Hadfield properties. Physical properties of bare moly-manganese as deposited are Rockwell hardness 85-90 B, as cold worked 43-47 C, tensile strength 100,000 psi, yield strength 85,000 psi; elongation in 2 in. is 14 per cent and deposits are nonmagnetic. The electrode is designed primarily as a build-up material for manganese steel parts. Sizes are 14 x 5/32, 3/16 and 1/4-in.

For More Details Circle No. 5—Page 259

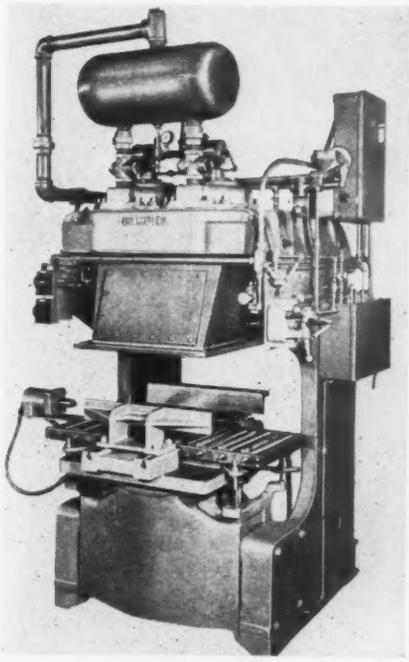
Roofing Compound: Dasco Chemical Co., 1602 Thames St., Baltimore—Roofing compound is reported to be completely fire-resistant and immune to alligatoring during long exposure to sunlight. It is said not to sag, flow, alligator or carbonize during prolonged exposure to heat up to 200°F, nor to be ignited by sparks. It contains no solvents of any kind. Available in red, gray, green and black, it may be applied with brush or spray on damp or dry surfaces and on tar, felt or slag roofs.

For More Details Circle No. 6—Page 259

Cleaner Attachments: Multi-Clean Products Inc., 2277 Ford Parkway, St. Paul—New attachments permit use of regular industrial vacuum cleaners for all kinds of heavy volume cleaning, including furnace and boiler cleaning, without danger of clogging tank and filters, getting ashes into the vacuum motor or bearings or burning hose with hot clinkers. With these attachments a standard 30-gal or smaller galvanized ash can may be added to the suction line of industrial vacuum cleaners. This arrangement operates on either wet or dry pickup. The manufacturer also claims that hazardous areas may be vacuumed without danger of explosion because only the ash can need be in the danger area while the vacuum is left outside and connected with the proper length of hose.

For More Details Circle No. 7—Page 259

Core Blower: Beardsley & Piper, Division of Pettibone Mulliken Corp., 2424 North Cicero Ave., Chicago 39—Core blower permits operator to select from three forms of control—automatic, semi-automatic and manual. When fully automatic operation is chosen, all operations of the core blower, including magazine loading,



are automatically controlled and timed. When semiautomatic operation is selected, the sand magazine remains in its blowing position until returned to its loading position by a manually controlled air cylinder. In this way the operator may blow several cores without taking time to return the magazine for loading after each blowing cycle. If manual operation is chosen, the core blower may be operated as a standard machine.

For More Details Circle No. 8—Page 259

Air Compressor: Curtis Pneumatic Machinery Division, St. Louis 20—Two-stage, air-cooled, 15 or 20 hp air compressor has a 5 x 7½ in. low-pressure and a 4-3/15 x 5 in. high-pressure cylinder. Piston displacements range from 78 to 92 cfm at pressures of 100 to 175 lb with the 15-hp motor, and to 108 cfm at 100 to 125 lb with the 20-hp motor. The use of cushioned, annular type disk valves and a four-section intercooler assertedly produces high efficiency in output of air delivered per minute per hp and per kwhr of electrical energy consumed. It also is available in 15 to 20 hp base-mounted units with or without motor, with or without separate air tank, and with constant running, automatic start and stop or dual controls.

For More Details Circle No. 9—Page 259

Centrifugal Fan: Westinghouse Electric Corp., Sturtevant Division, 200 Readville St., Hyde Park, Boston 36—New airfoil blade design and aerodynamic changes in inlet and casing have boosted mechanical efficiency of nonoverloading, centrifugal fan to 92 per cent at peak with a reduction of five decibels in noise intensity level. Designed especially for industry, power and commercial building needs, the new fan ranges in wheel sizes from 40¼ to 108¾ in. in diam and is capable of delivering air volumes up to 600,000 cfm.

For More Details Circle No. 10—Page 259

Lubricant: G. W. Smith & Sons Inc., 5400 Kemp Rd., Dayton 3, O.—High-temperature lubricant for cold chamber die casting machines is said to achieve the following results: Eliminates all galling and sticking of plunger; plates plunger and cylinder walls with an adherent lubricating coating that will not run off at high temperature; protects plunger and cylinder against corrosive action of molten aluminum and makes possible five to seven more casting shots than usual between applications. It is available in 1 and 5 gal pails and in 55-gal drums.

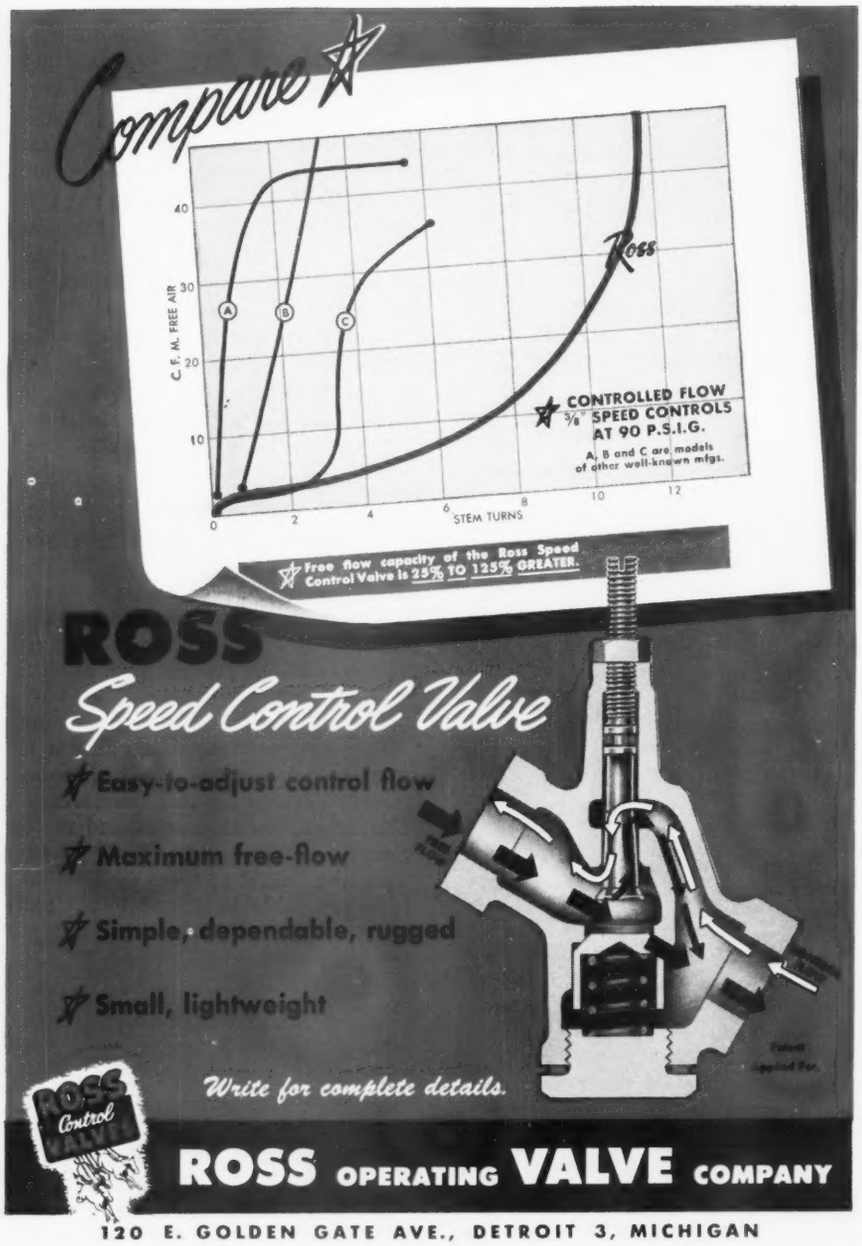
For More Details Circle No. 11—Page 259

Shell Mold Bond: Borden Co., Chemical Division, 350 Madison Ave., New York 17—Synthetic resin adhesive for bonding shell molds makes possible economical production of strong, good surface cast parts with a rapid set. It comes in powder form and when mixed has a usable life at room temperature of about 4 hr. The manufacturer claims the elimination of swelling and finning.

For More Details Circle No. 12—Page 259

Pilot Device: Jervis B. Webb Co., 8951 Alpine St., Detroit—Mechanically operated pilot device for controlling relays, motor starters, solenoid valves, etc., is particularly adapted for operating switches, stops and feeders, automatic transfers and similar devices on conveyors. The actuating arm

IF IT'S A VALVE
FOR FOUNDRY WORK—
ROSS HAS IT



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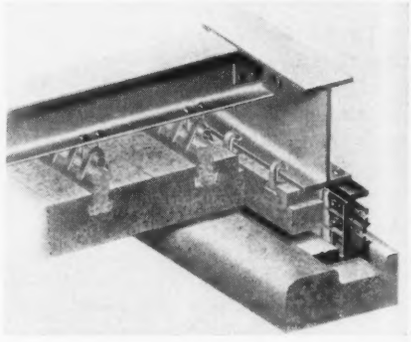
can be set in any of 72 positions in 360-degree arc. Arm rotation of 10 degrees in either direction operates contacts, of which there are four, electrically separate. Overtravel up to 80 degrees beyond actuating point will not cause damage.

For More Details Circle No. 13—Page 259

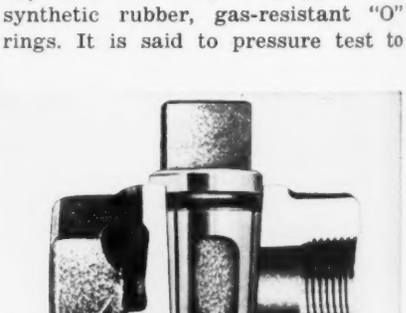
Sand Seal Shoe: Geo. P. Reintjes Co., 2517-19 Jefferson St., Kansas City 6, Mo.—Sand seal shoes for movable covers of furnaces are claimed to eliminate escaping gases



which overheat shoes and girder frame when sand in coping is wavy or has longitudinal grooves in it. A pair of opposed shoe castings bolted to pit frame form an inverted "V" slot where they penetrate the sand. As they displace the sand, the sand so confined compacts and moves upward and endwise to fill the triangular space completely.

For More Details Circle No. 14—Page 259

Gas Meter Stop: Mueller Co., 512 West CerroGordo, Decatur, Ill.—Iron body, ground brass key, plug type gas meter stop is equipped with synthetic rubber, gas-resistant "O" rings. It is said to pressure test to



the destruction point of the casting without leaking. Features of the stop are low turning torque said not to change appreciably with time or use; proper adjustment permanently

(*Continued on page* 263)

HELPFUL IDEAS FOR FOUNDRYMEN

AVAILABLE FOR THE ASKING—This reader-service is designed to provide foundrymen with "Idea" and reference material. Listings are selected from company product literature and reprints of special FOUNDRY editorial articles.

51. Self-Cleaning Conveyors

Carrier Conveyor Corp. — Rather than try to describe all the doohickies, flycalks and farbs on this line of self-cleaning Natural-Frequency conveyors, we suggest that you send for this 12-page illustrated bulletin. They use a mechanical principle which permits longer unit lengths with high capacities.

52. Ovens, Heaters, Booths

Burdett Mfg. Co.—Photographs and descriptions of Burdett ovens, heaters, air make-up units, spray booths and washers are contained in 12-page bulletin. The "radiant heat" principle is described and various applications are shown.

53. Dust Collectors

Torit Mfg. Co.—ah-CHOO! Dust make you sneeze? You can collect it from dusty locations around your plant with any unit in the dust collector line described and illustrated in this 24-page catalog No. 36. Covered are cabinet and cyclone types, in sizes from 1/3 to 5 hp, and fittings and accessories.

54. Molding Machines

Pioneer Mfg. Co.—Fast, simple, economical, easy to run—that's what this 4-page illustrated circular says about Rapid molding machines. Features and specifications for nine models to meet various needs are given.

55. Abrasive Materials

Cleveland Metal Abrasive Co. — Let's not be evasive, there's only one abrasive that's fully persuasive. It's 20th Century. (They'll have to change the name for it to rhyme.) All the dope on this line such as uses, advantages and selection are given in 8-page illustrated catalog 152. Types covered are chilled and normalized shot and grit, drawn steel cleaning and peening shot, and iron powder.

56. Melting Furnaces

Stroman Furnace & Engineering Co.—Much information on the Stroman line of mechanical and hydraulic tilt crucible melting furnaces is contained in 4-page bulletin No. 85. Illustrations show units with stationary lip pour for brass, bronze, aluminum and other nonferrous metals. Specs are there, too.

57. Pneumatic Tool Lube

New York & New Jersey Lubricant Co.—NR grades of Non-Fluid oil for lubrication of pneumatic tools and equipment lubricates and rustproofs at the same time. It is described in illustrated bulletin No. 550. All surfaces have a constantly maintained protective film. For an oil that's gooid, get Non-Fluid.

58. Exothermic Compound

Foundry Services, Inc.—Sound castings, increased yield and reduction of riser size are advantages derived from use of Foseco Feedex, an exothermic compound that is mixed with water, molded into various shapes and inserted into molds. Incoming metal ignites it to keep the metal hot for 1 hour or more. Read all about it in this illustrated bulletin.

59. Pneumatic Tools

Reed Roller Bit Co., Cleco Div. — Geo. Pope (FOUNDRY's Bus. Mgr.) wouldn't have wanted this 24-page illustrated catalog 47 on Cleco pneumatic tools reviewed if it weren't good. Besides construction features, it has complete specs. Riveters, chipping hammers, sand rammers, rotary drills, nut setters, screwdrivers, grinders and sanders, die grinders, impact wrenches, hose and fittings and valves are covered. George said so.

60. Mixer Improvements

National Engineering Co. — Improvements which can be made in your Simpson Mixers are described and illustrated in this 6-pager. These include redesigned plows, air operated doors, double discharge doors, aerator antiwear changeover and safety grates, antifriction vertical shaft, material sampler and liquid funnel.

61. Pyrometer & Velocity Meter

Illinois Testing Laboratories, Inc.—12-page illustrated bulletin No. 4257 describes the Alnor Pyrocon contact pyrometer for surface temperatures. With it you get bulletin No. 2448 on the Velometer, an instantaneous direct-reading air velocity meter. Its 8 illustrated pages show many uses.

62. Molding Machines

Herman Pneumatic Machine Co.—The felLow that usually rites this has gone too lunch. Hee told me to finnish it. First, theres' a 20-page Booklet with photografs and words on some molding machine installations in leading Foundries, from Alabama to Zamboanga, wherever that is? Also, there is quite a few data sheets, or maybee a few more, on high speed jarring machines, independent turnovers, pattern drawing devices, stripping (pardon the expression) units and a few others. You should get oodles of good facts. Oh, here's Mr. Adams back again.

Additional Information?

For additional information on any of the items described under "New Equipment and Supplies." "Trade Publications" or "Ideas for Foundrymen" in this issue—simply circle corresponding item numbers on accompanying cards

Helpful IDEAS

63. Industrial Change Rooms

The Moore Co.—"The Design and Layout of Industrial Change Rooms" is 18-page booklet which describes a clothes storage system centering around the suspension type locker-basket. Wire basket can hold shoes, work gloves, stolen tools and other personal effects. Duds are hung from basket and the whole shebang is hoisted to stratospheric heights to be left hanging high and dry. Probably the best place for the smelly old things.

64. Overhead Handling

Cleveland Crane & Engineering Co., Cleveland Tramrail Div.—To decrease overhead why not increase your overhead—handling, that is. 12-page illustrated brochure C-2303 will give you the latest on overhead materials handling equipment. Stop crane-ing your neck looking for lost profits, track down your handling problems by riding the Tramrails and arch beams. Profit will hoist themselves.

65. Linings for Ladles

Ironton Fire Brick Co.—Desulfurizing in foundries is increasing in importance. Therefore, we ask you, is the little ladle of the house working her linings to the bone to keep you in better metals? She may need a new NoJoint monolithic refractory lining to resist those nasty soda ash slags. 8-page bulletin 102 will tell you how to do it. So, common man, give the ladle of the house a break.

66. Heat Machines

Fageol Heat Machine Co.—Want to heat men at work. . .not empty spaces? Naturally! Then get 6-page folder L-5391 which gives all necessary data on two heat machine models which spray heat along floor to form 6-ft blanket of warmth.

67. Deduster

Gotta dust deluge in your foundry? Wanta lick this problem? Then, getta pencil and one of the handy Dracco Engineering Data Sheets for dust control installations. It's easy to determine the most efficient dust control system to fit your specific requirements. Copies of these installation sketch and data forms will be sent free by Dracco Corp.

68. Belt Conveyor Carriers

Stephens-Adamson Mfg. Co.—Did you know that for every round trip of the average conveyor belt, the carriers underneath it rotate hundreds of times, support tons of material and are subjected to moisture and temperature extremes? Only the finest can take that punishment, and according to 18-page bulletin 1150, that calls for S-A belt conveyor carriers. Eight styles are described and illustrated along with those for special applications.

69. Aluminum Alloys

Apex Smelting Co. — Alloy there mate! Would you like to know the mechanical and (ahem) physical properties of the sand or chill cast Ternalloy sisters, namely 5, 6, 7 and 8? They'll give you everything they've got without any heat treatment. And dimensions? Man what stability! They'll machine and polish nice too, and won't start corrodin' with a little handling—if you know what I mean. All the dope's in 6-page folder 2-50.

70. Continuous Power Conveyor

Richards-Wilcox Mfg. Co. — Wigwag to your secretary to mark this No. for more info on the No. 2035 Zig-Zag continuous power conveyor. In 36 illustrated pages you can see and read about typical installations, understand construction features and find out about accessories, suspension methods, drive units and other engineering data. Step on it, Stephanie.

71. Belt Fasteners

Flexible Steel Lacing Co.—In the coal mining field where underground conveyors must be constantly extended to keep close to the working face, Flexco hinged belt fasteners are in wide spread use. 4-page bulletin H.F. 500 describes these fasteners and gives instructions in mounting them on belt. Accompanying bulletin A-70 describes Alligator long length conveyor belt lacing. Get them both!

72. Flask Maintenance

Sterling Wheelbarrow Co.—Those flasks are back again—the foundry type and not the hip pocket type, of course. Company's sales manager has written pocket-size 24-page illustrated booklet entitled "How to Select and Maintain Foundry Flasks." Why don't you fl-ask for one?

73. Thru-The-Air Handling

Harnischfeger Corp.—Want to give your materials handling a lift and perhaps hoist profits at the same time, then lend an eye to 20-page bulletin H20-1 descriptive of P & H Zip-Lift electric hoists. It points out advantages, operating features and offers an excellent inside view of the unit's engineering. Numerous application pictures as well as clearance data and specs are included.

74. Core Blower—Whoosh

Federal Foundry Supply Co.—The Pulsator model San-Blo for blowing open wood and metal core boxes is described and its operation outlined in 4-page illustrated bulletin P-1. Several models are offered. Incidentally, pulsating is using two, three of four short, quick blows, instead of one long Whoo-oo-sh.

75. Aluminizing Process

Metallizing Co. of America—Little old process passing by, catching e'vry one's eye. The aluminizing process for protecting metals exposed to elevated temperatures isn't passing by, however, but is still practiced. It consists of spraying pure aluminum coating over areas to be affected by heat corrosion and utilizes the Mogulectric gun. The story is in a recent interesting issue of "The Metallizer."

76. Heat-Treating Equipment

Pressed Steel Co.—Generous illustrations of containers, fixtures and retorts commonly used in carburizing, annealing, etc. are found in 24-page booklet No. 52 along with installation views of new equipment for saving handling and heating time. You'll also find various types of tubing for annealing, firing radiant furnaces, venting noxious gases and protecting thermocouples.

77. Metal Melting Furnaces

Stroman Furnace & Engineering Co.—20-page bulletin No. 800 sizzles with descriptions and illustrations of the latest white and nonferrous metal melting furnaces, both stationary and tilting. Skip hoists, smelters furnaces and revolving tray and stationary core ovens are covered as well.

78. Dust Collecting

Claude B. Schneible Co.—"The Invisible Shield" may sound more like tonight's midnight movie on TV, but it's actually the title of an available 22-minute film in color and sound on the Multi-Wash dust collecting and ventilating system. It's also the

For Foundrymen

title of 8-page bulletin 852 which reviews by means of drawings and text the system as presented in the film. Send for it!

79. Warm Air Heaters

Dravo Corp.—You'll cry bravo for Dravo when you read 30 good reasons why Counterflo direct-fired, warm air heaters rate high in industry. They're contained in 8-page bulletin 526 which also describes working principle of these gas, oil or coal fired heaters. Five ways heater can work for you are itemized in accompanying bulletin ST-526-O213.

80. Air Cylinders & Devices

Bellows Co.—"Controlled-Air-Power" has nothing to do with faster-than-sound aircraft or Air Corps organization. It's a 24-page illustrated catalog, identified as No. CL-30, that tells you how faster, safer and better production figures can be maintained through the use of air actuated devices such as cylinders, air motors, table and machine feeders, vises, arbor presses and controls.

81. Lift & Weigh It

Hydroway Scales, Inc.—Any load handled by a crane or hoist can be weighed with the Hydroscale as it is lifted. This handy and accurate device hangs on the crane hook and has its own hook for attaching to the load. Dial sizes of 12, 24 and 30 in. make for easy reading at a distance, and capacities range from 500 to 100,000 lb. All the dope on these scales is given in 8-page bulletin.

82. Backstand-Belt Polishing

Armour & Co.—There's savings to be had through the use of the backstand method of polishing metal products. Backstand belts are available in wide range of grains and grit sizes to meet every grinding or finishing need. They're easy to stock. To get the full story of backstand-belt polishing as well as some sound case studies, just send for this 8-page illustrated manual.

83. Vibration & Noise Stopper

Fabreeka Products Co.—Are your nerves shattered? Does Johnny's pounding on the piano drive you nuts? Do you stay awake (nights, that is)? Then chances are you'd better get some Fabreeka—but quick! There's a size and type to fit every (Foundry) need and pocketbook. This miracle material will minimize impact shock, vibration and noise of moving machines and equpment. The full story is told in 36-page data book.

84. Bushings, Pins & Chucks

Universal Engineering Co. — Over 100 pages of "Universal Catalog No. 1020" and accompanying price list and condensed data section are filled with information on flask pins and bushings, index plungers, production vises, boring chucks, drill bushings, tool holders, collet chucks and boring bars. Of special interest to you foundrymen are the various types and sizes of precision flask pins and bushings.

85. Conveyor Belts

Barber-Greene Co.—Some belts hold up your pants and hold down your tummy, but here is a line of conveyor belts that will hold up for a long time and hold down your replacement costs. Described in 8-page illustrated bulletin, the belts are made in various types for varied applications. Get the specifications, pertinent information on how to select and other data.

86. Oscillating Conveyor

Link-Belt Co.—Ordinarilly things that oscillate don't belong, here, but for conveyors of this type, that's different. This 24-page booklet No. 2444, with pictures, describes Positive Action Oscillating Conveyors for conveying, feeding, cooling, screening various bulk materials. Booklet has dimensions, weights, capacity and horsepower charts for Torsion Mount heavy duty oscillators and Flexmount oscillator for lighter duty uses. Set your pen to oscillating.

87. Clean Up

Bradley Washfountain Co.—There's nothing like a warm, cleansing, refreshing shower at the end of a full day's work in the foundry to keep the morale of your employees at top pitch. Or, maybe, they like a convenient place to wash up before lunch. In either case, Bradley circular washfountains and multi-stall showers will do the job. They're shown in 24-page catalog 5204. They save space, water and money, too!

11-52

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88. Belt Grinding Attachment

Buckeye Tools Corp.—This is the nuts! This belt grinding attachment for horizontal grinders combines the maneuverability of the portable grinder with and the utility of an abrasive belt. Described in 4-page illustrated booklet S-13, the attachments are available in two sizes. Get it—but quick.

89. Foundry Specialties

Smith & Richardson Mfg. Co.—Chaplets, hinge tube, catches, screw shells, skim gates, perforated tin plate and babbitt anchors are but a few of the many items covered by 24-page catalog 148. All products are shown, described briefly and sizes and prices are quoted. No foundry buyer's guide is complete without this one!

90. Feeders & Elevators

Kent Machine Co.—In the 2-4/5 pages (one corner is cut off for artistic reasons) of this folder, Kent automatic feeders and elevators for bulk materials are described. Bucket elevators are offered in belt driven and motorized top drive types, while feeders are belt and reciprocating.

91. For Your Foundry

Claud S. Gordon Co.—Here's a periodical that covers various instruments which every foundry needs. One recent issue had information on pyrometer accessories, furnaces and ovens, pyrometer controllers, sand testers, furnace pots and Tempilstiks, the crayons that tell temperatures. Get on this list.

92. Furnaces

Dear Joe: Just dropping you a line to tell you to send for these two bulletins put out by the Lindberg Engineering Co. No. 28-A describes and illustrates the line of Simplex metal melting and refining furnaces, while No. 301 covers Lindberg-Fisher stationary crucible melting furnaces. You'll find them helpful. Regards, Sam. P. S. Say hello to Mabel.

93. Heavy Duty Refractories

Norton Co. — Snappy as a new sleeve garter (1890 A.D.), this 20-page catalog 803 gives you all the dope (and we mean a-l-l) on Alundum, Crystolon and Magnorite heavy duty refractories, made in various types for many, many, many applications. Standard shapes are covered, charts are included and properties are tabulated. Hop to it, Jewitt.

94. Mechanized Handling

Buda Co.—The strong fast muscles of mechanized handling are available to all with modern Buda diesel or gasoline powered FT series fork lift trucks which come in sizes with capacities from 3000 to 7500 lb. They're fleet, maneuverable and versatile. A wide range of attachments adapts them for almost any handling job with lifts from 42 to 168 in. for stacking or elevating. Bulletin 1570 tells all. Want a copy?

95. Overhead Handling

The 32 pages of catalog No. A-64 are packed with data on overhead track systems which modernize materials handling operations. Detailed are track, clamps, brackets, switches, turntables, cranes, trolleys, electric conductors, overhead track scales, dumping buckets and typical overhead conveyor installations. There's always room to reduce overhead with overhead handling items built by Richards-Wilcox Mfg. Co.

IMPORTANT READING FOR FOUNDRYMEN
We have a limited quantity of the following reprints which we can furnish while they last.

96. Pyrometry

Robert A. Colton of the research dept. of American Smelting & Refining Co. is an expert on pyrometry. Its application in the nonferrous foundry is covered in detail in this reprint of two FOUNDRY articles. They discuss the various influences of temperature control and the types of pyrometers and how to use them effectively.

97. Mobilization Planning

How a foundry's facilities and personnel can contribute to the defense effort should be given in an industrial mobilization plan. Discussed in a reprinted FOUNDRY article by Donald Armstrong, president of United States Pipe & Foundry Co., the survey can be of value to company and national security. Get this for present and future planning.

98. Selecting Flasks

"Importance of selecting the correct type and size of foundry flask for the particular job, and then keeping the flask in good operating condition cannot be stressed too strongly." Thus begins this reprint from FOUNDRY, "How To Select and Maintain Flasks." Here is fact combined with picture that is m-u-s-t reading. Flask for it!

99. Nickel-Alloyed Castings

"Nickel-Alloyed Brass and Bronze Castings" is the title of a FOUNDRY-reprinted article by James S. Vanick, a metallurgist of International Nickel Co. The first of a series, it offers much valuable info and has charts, tables and good pix.

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(*Continued from page* 258)

fixed at the factory; retainment of pressure-holding qualities without maintenance, and a sealed grease system which lubricates all rubbing surfaces and provides automatically the proper grease film for an extended time.

For More Details Circle No. 15—Page 259

Centrifugal Pump: Gardner-Denver Co., 1011 S. Front St., Quincy, Ill.—Centrifugal pump operates with equal efficiency when rotated in either direction. It is designed primarily for circulating cooling water in air compressors, diesel and gasoline engines and other water-cooled machines. Advantages are said to include easy installation in any position on a machine, simplified piping design and adaptability to any type of drive. Available for heads up to 50 ft and for capacities up to 67 gpm, the pump is fitted with prelubricated ball bearings and has a mechanical seal that is said to eliminate stuffing box leakage.

For More Details Circle No. 16—Page 259

Screw and Nut Assembly: Whiting Corp., Hydro-Arc Furnace Dept., Harvey, Ill. — Ball bearing screw and nut assembly for tilting direct arc furnaces on their rockers

is said to avoid stripping and the consequent uncontrolled rocking of furnaces which causes heat loss and hazarous splashing of molten metal. The new assembly is intended for use on furnaces currently in use as well as on new production.

For More Details Circle No. 17—Page 259

Gage Blocks: The DoAll Co., 254 N. Laurel Ave., Des Plaines, Ill.—Gage blocks made of a new chromium-carbide metal have a coefficient of expansion practically identical with that of steel; yet they also possess extreme hardness. They are so durable that they may be used under

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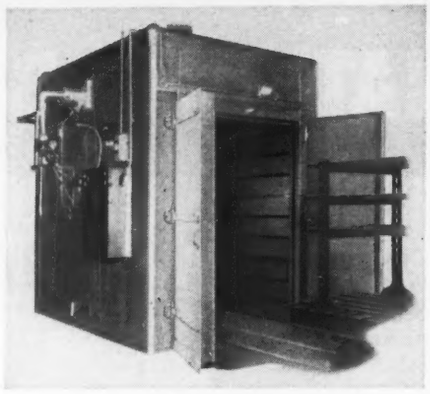

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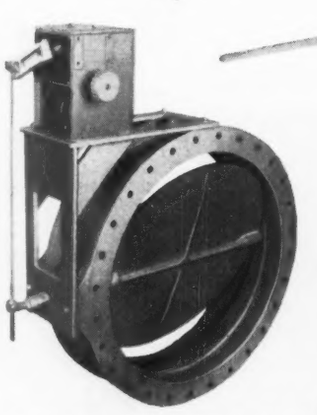
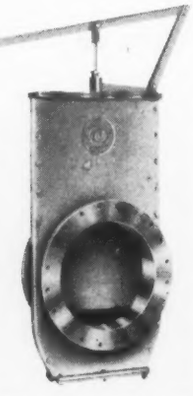


Rockwell Standard Butterfly Valve with electric motor operator; may be equipped with air or hydraulic operator, solenoid or any manual control.



Rockwell "Kwikleen" Slide Valve with lever control; bottom plate easily removed for quick cleaning of valve.

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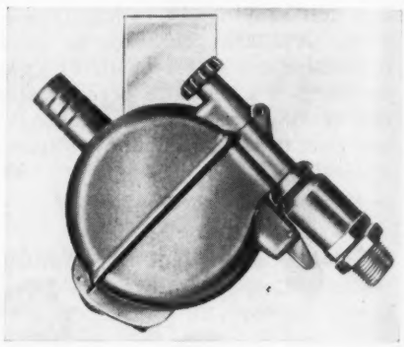
almost any working conditions, not only under those of a laboratory. Their wearability and long-life accuracy are enhanced because the new metal permits a superior surface finish and resists oxidation and corrosion. It will not oxidize at temperatures up to 1000°F and resists perspiration and other types of acid normally encountered in a shop. These blocks are offered in A and B grade accuracy in four different sets.

For More Details Circle No. 18—Page 259

Air Control Valve: B. F. McDonald Co., 5721 West 96th St., Los Angeles 45—Air flow control valve regulates air supplied to helmets and air-fed masks by a positive action adjustment knob which is easy to



set, but cannot be changed accidentally. To insure ample air supply, flow cannot be reduced to less than 2 cfm. The valve detaches quickly from the air hose, and a separate spring-loaded, ball-type valve on the hose end automatically stops the air flow. Although it weighs only 6 oz, the die-cast aluminum valve body resists denting or other impact damage. The assembly has three parts: air flow check valve, cartridge and cartridge container.

For More Details Circle No. 19—Page 259

Lubricant: Electrofilm Corp., 7116 Laurel Canyon Blvd., North Hollywood, Calif.—Air dry lubricant which can be sprayed or brushed on is said

to have good lubrication characteristics at temperatures from minus 7[illegible] to 300°F. It can be applied to steel

iron, stainless steel, lead foil, aluminum, brass, wood, cork and other surfaces and is resistant to hydraulic fluids, gasoline, lubricating oils, water and other liquids.

For More Details Circle No. 20—Page 259

Filing Cabinets: Empire Development Corp., 15 Park Row, New York 38—Steel filing cabinet keeps blueprints safely, neatly, and conveniently without wrinkles, creases or curled edges. It accommodates 1250 prints, each of which hangs smoothly. An index file locates any print instantly, and all are immediately accessible so that any print can be removed without disturbing the others. Suspension rods support the drawings. When front panel of cabinet is removed, any drawing may be filed or taken out. One model is 20 x 30 x 48 in. and a second is 20 x 39 x 48 in.

For More Details Circle No. 21—Page 259

Protective Coatings: Markal Co., Dept. PC, 3050 W. Carroll Ave., Chicago 12—Chemical that can be sprayed, brushed or dipped on like paint forms protective coating for metals against scaling and corrosion from 0 to 1850°F. Another coating is made to withstand corrosion caused by steam, hot water, salt spray, hot acids and mild alkalies at temperatures from 0 to 600°F.

For More Details Circle No. 22—Page 259

Automatic Sprinkler: Globe Automatic Sprinkler Co., Inc., 250 Park Ave., New York 17—Extremely sensitive sprinkler opens very close to its rated temperature by utilizing a solid chemical for its fusible ele-

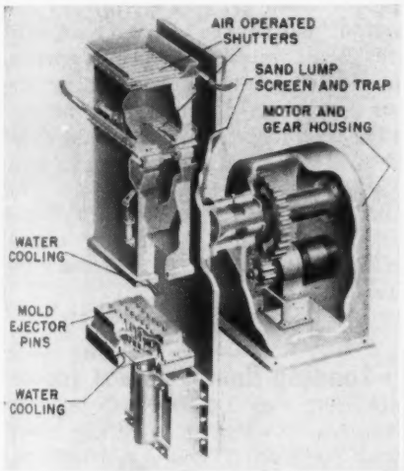
Automatic, Rotating Table Machine Makes Shell Molds

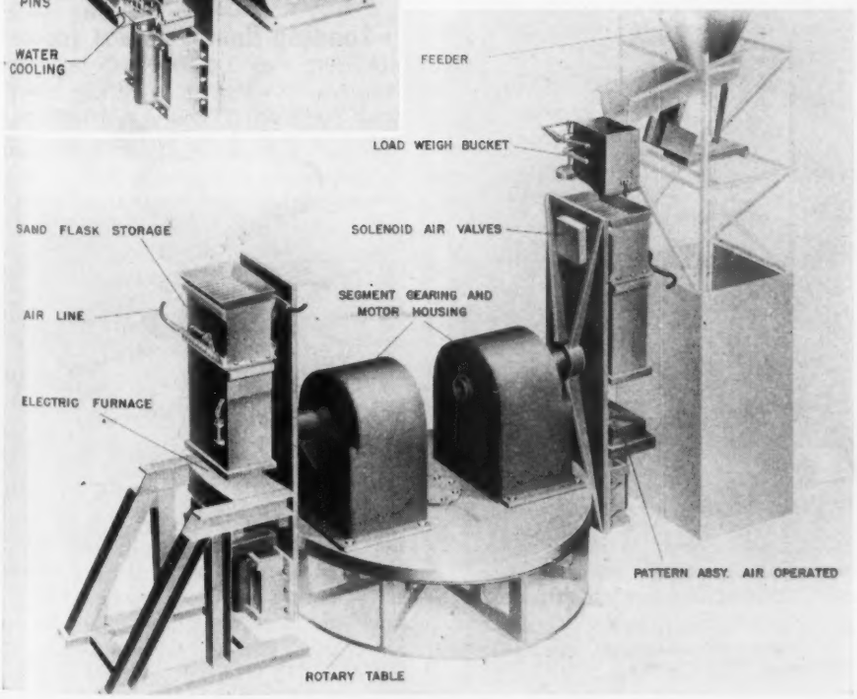
SHELL mold making machine consists of a continuous rotary or a rotary indexing table on which are mounted one or more unit heads. Each head performs the functions of pattern heating, sand dumping, rollover and stripping as it rotates around that portion of the circle not occupied by the mold curing furnace. Unit heads can be added or removed to meet production requirements.

Generally the mold curing furnace occupies about 180 degrees of the entire circle on a continuous rotary machine. Electrically heated and thermostatically controlled, it has a temperature adjustment range up to 2000° F and is equipped with a blower arrangement to increase efficiency. One small furnace is used on a two-station indexing machine and two on a four-station indexing machine.

As a mold leaves the furnace, air-cylinder-operated ejector pins remove it from the pattern. Rods on the removing mechanism thread through the stripper pins and pick up the mold, whereupon the pins are withdrawn. The mold then is rotated 180 degrees and dropped on either a rack or take-away conveyor. During this operation the mold is blasted with air to accelerate cooling and setting before it is touched by hand.

After the mold has been removed, the pattern passes a rotary brush and an air nozzle and exhaust arrangement which clean off any particles of adhering sand. It then passes under spray nozzles which deposit silicone lubricating solution on the pattern face. Next, two air cylinders operated automatically by solenoid control valves move the pattern up to contact the sand flask. The lower shutter in the sand flask opens automatically to drop sand on the pattern.





The mold is semicured on the hot pattern, which is electrically heated by adjustable thermostatic control to temperatures up to 800° F. The closed sand flask and pattern assembly is rotated 180 degrees to dump excess sand. When this sand is returned to the storage chamber section of the sand flask, the lower shutter closes and the sand is screened through an electrically vibrated screen so that no semicured lumps can get into the sand reservoir and spoil subsequent molds.

As the pattern and sand flask assembly continues to swing into the pattern face up position, the pattern is withdrawn from the sand flask proper, clearing a space to permit the pattern and the semicured mold to pass into the curing furnace. The sand flask at this point rides above the furnace. The top shutter of the storage section of the sand flask opens automatically to receive fresh sand from a load bucket.

Pattern plate sizes up to 30 x 40 in. are covered by present equipment, but larger ones can be accommodated. Production time depends upon the type of machine used and the number of heads per machine. On a two-head indexing machine, time per shell is equal to the mold curing time plus about two seconds to index 180 degrees. Mold curing times usually run from 15 to 45 seconds, depending upon the thickness and the size of the molds.

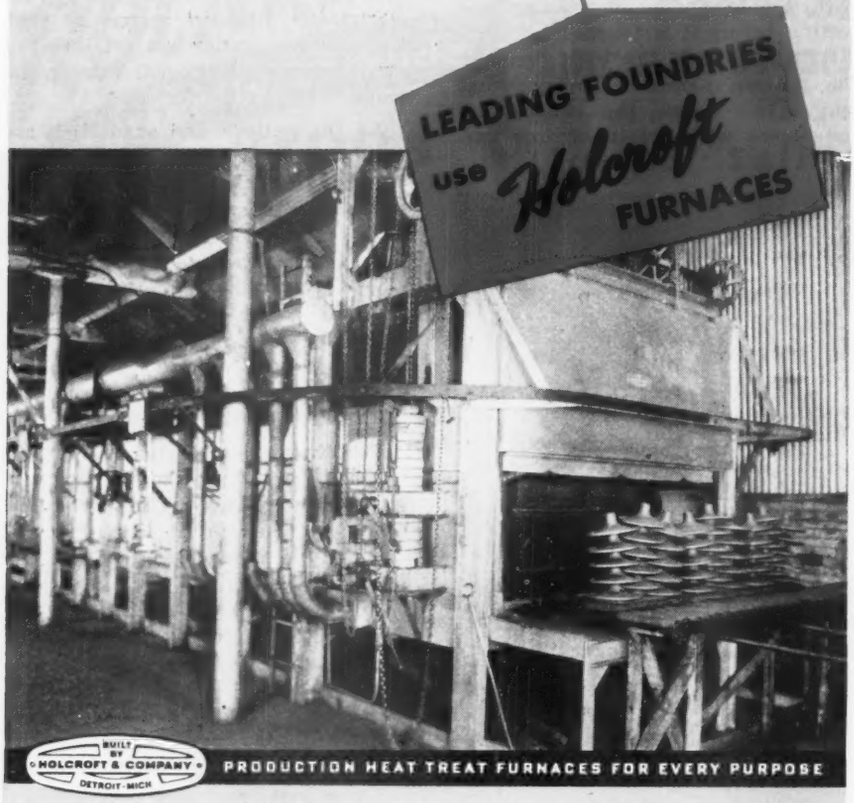
These machines were developed by Winter Engineering Co., Shellcast Corp., 1200 Niagara St., Buffalo 13.

For More Details Circle No. 23—Page 259

This heat treating furnace, built for malleable annealing of white iron castings, was a Holcroft innovation back in 1934. It was a trail blazer, featuring such new concepts as controlled atmosphere, light-weight refractories, and short time annealing.

Holcroft has long been known as a pace maker in the heat treat field. Many practices—standard operating procedures in all metal-working plants today—were original Holcroft developments. Even now, new conceptions in heat treating are being worked on in Holcroft laboratories.

You, too, can do business with an industrial leader. Write today. **Holcroft and Company, 6545 Epworth Blvd., Detroit 10, Mich.**



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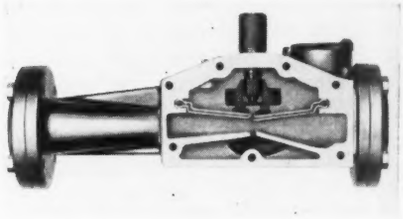
CLEVELAND 15 — Wallace F. Schott, 1900 Euclid Ave.
HOUSTON 1 — R. E. McArdle, 5724 Navigation Blvd.
CANADA — Walker Metal Products, Ltd., Windsor, Ontario
EUROPE — S. O. F. I. M., Paris 8, France

ment. When the surrounding atmosphere attains the temperature for which one of these sprinklers is rated, the fusible element changes to a liquid, thus opening the closure and permitting the water to discharge. The element is available in different compounds for sprinklers having temperature ratings of 135, 160, 212, 280, 340 or 415°F. Sprinkler frame is made of special bronze composition and its releasing members of die-stamped Monel.

For More Details Circle No. 24—Page 259

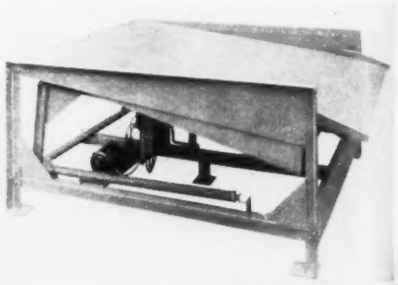
Gas Mixer: Eclipse Fuel Engineering Co., 1002 Buchanan St., Rockford, Ill.—Mixer is said to simplify changing heating loads on combustion equipment. A built-in, adjust-



able orifice eliminates replaceable jets and changes volume of automatically proportioned gas and air for any Btu output within the capacity of various sized mixers used in furnaces, ovens, etc. Gas entrained by the air stream is automatically proportioned to form a mixture that gives perfect combustion at all heating loads. A metering valve regulates the pressure for operating control equipment and for burning mixed, natural or LP gas. Various sizes are available.

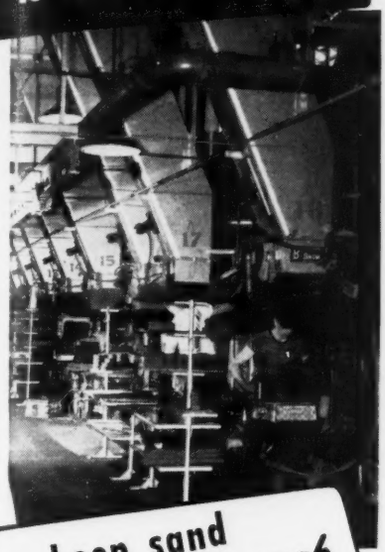
For More Details Circle No. 25—Page 259

Loading Ramp: John B. Illo Engineering Co., 2414 E. 57th St., Los Angeles 58—Portable loading ramp with pushbutton control is said to enable one man to do work of ten. It



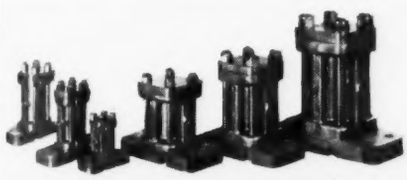
can be installed in 5 minutes at any loading dock and its hydraulically operated dock adjusted to any truck bed height in a few seconds. It is available in a manual model and in an electrically powered model which requires a 110 v outlet. Travel of dia-

Is it worth $52.05



to keep sand *Moving Through* your hoppers?

That's all it costs for an average foundry installation of a Cleveland Air Vibrator on a standard steel hopper of 3000# capacity!



Not much money, is it, to *guarantee* even, continuous flow of sand into, through and out of your hoppers?

There's a type Cleveland Air Vibrator for all your foundry requirements.

Arching, sticking and bridging can be eliminated temporarily with a hammer, but that's doing it the hard, expensive way.

A Cleveland Air Vibrator can be easily installed and set to operate either continuously, or on an intermittent basis. Won't ruin your bins.

The Type F, illustrated, is widely used in foundries across the country and in Canada and is made in 6 sizes.

Standard metallic impact and quiet types available.

BIN STUCK LATELY?

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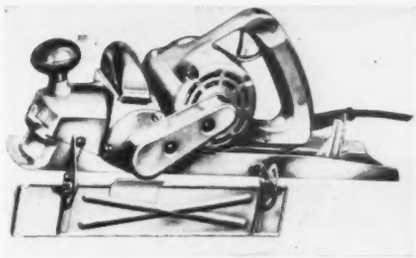
mond floor plated deck is 24 in. Adjustable throw plate can be easily raised or lowered for installation inside building without interfering with doors and can be locked in horizontal position during loading, as can the deck. The ramp is counterbalanced by tension type coil springs to eliminate additional load on truck beds. Its capacity is 20,000 lb.

For More Details Circle No. 26—Page 259

Electric Plane: Skilsaw Inc., 5033 Elston Ave., Chicago 30—Portable electric plane does flat surface and edge planing. It makes a 3-in. wide cut and has ⅛-in. depth of cut capacity. Depth of cut is accurately lever controlled with 1/64-in. gradations. Cutter head travels at 13,500 rpm and assertedly produces a surface that normally requires no sanding. A chip deflector that keeps work area free of chips may be directed



either right or left. The plane weighs 10½ lb. It has an aluminum alloy housing and features ball bearing construction throughout.

For More Details Circle No. 27—Page 259

Autoclave Covers: Clearing Process Cover Corp., 5620 W. 65th St., Chicago 38—Covers for pressure ves-

sels used to impregnate castings are designed to open and close in a matter of seconds. They are available in diameters up to 42 in., working pressures to 600 psi and for vacuum service with temperatures not exceeding 300°F. Two types are available. Both operate without bolts, threads

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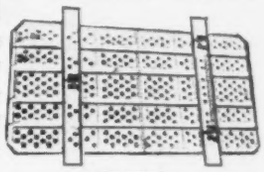

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Rollers are shielded from sand and from molten metal.

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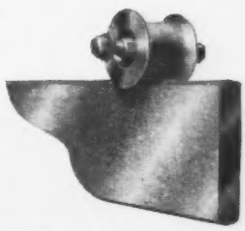
The rollers ride smoothly on twin rows of ball bearings. Non-lubricated, the bearings require no oiling or maintenance.



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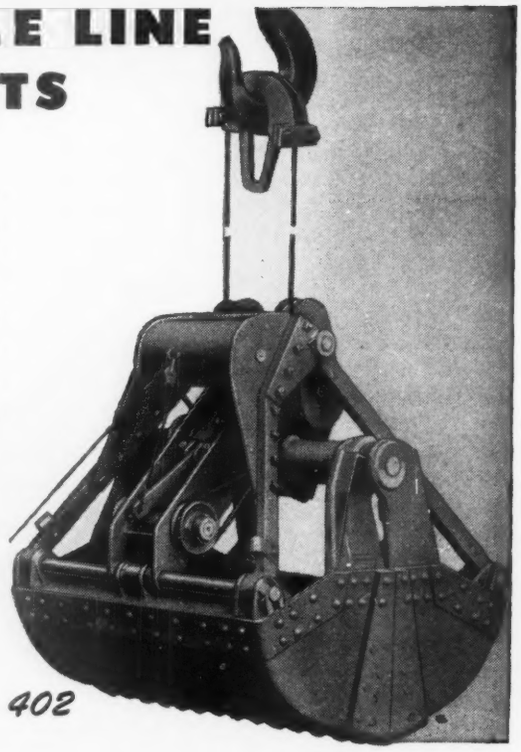

ILLUSTRATED is the hook-on type, for intermittent service. It is reeved and ready for operation on overhead traveling crane, monorail hoist, locomotive crane, derrick, ships tackle or any other hoisting device which has but a single hoisting drum available for bucket duty. Just slip the yoke over the crane hook.

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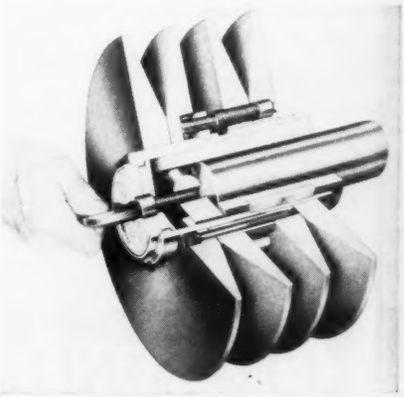
and multiple lugs and provide positive pressure seals although they are made with minimum ⅛-in. clearance at the locking surfaces to eliminate sticking and jamming. Safety devices prevent pressure buildup when cover is not completely closed and prevent removal of cover when the vessel is under pressure. Air-operated cover handling devices are available. In certain instances cover assemblies can be adapted to existing vessels.
For More Details Circle No. 28—Page 259

Mat Switches: Recora Co., 7419 South Western Ave., Chicago 36—Extended area electrical switches in the form of sheets or thin mats in any size or shape from 2 x 2 in. to

36 x 144 in. are actuated by predetermined pressures ranging from a few ounces to several tons. Because they are 3/16 in. thick, they can be used on floors, platforms, stair treads or similar locations without obstructing foot or vehicle traffic. Foot pressure on any part of the area covered by the mat closes the circuit; release of pressure instantly opens it. Mats are hermetically sealed against moisture. They can handle up to 1 amp at 110 v directly and can control the operation of high-voltage, high-current devices when used in conjunction with the company's control boxes.
For More Details Circle No. 29—Page 259

Variable Speed Drive: Dodge Mfg. Corp., Mishawaka, Ind.—Engineering features in the four units which comprise a new variable speed drive increase production and cut

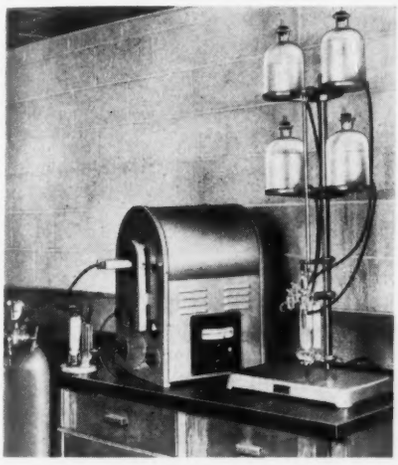


downtime, according to the manufacturer. The components are a variable pitch motor sheave, a set of wide range belts, a companion sheave and a slide motor base. Variable

sheave assembly locks on the motor shaft as a unit with the turn of a screw. Pitch diameter is changed easily by a one-point adjustment. Belts are oilproof, heat resistant and static conducting. Slide motor base permits changes in center distances to preserve proper belt tension as variable pitch sheave is adjusted for different speeds.

For More Details Circle No. 30—Page 259

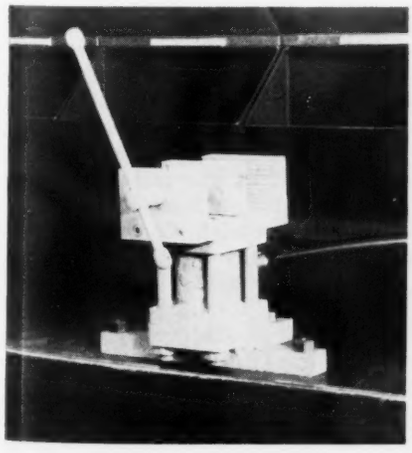
Sulphur Analysis: Harry W. Dietert Co., 9330 Roselawn Ave., Detroit 4—New model of sulphur analysis apparatus includes a permanent titration vessel and a newly designed bubbler. Solutions are fed directly to the titration vessel from visible



storage bottles, eliminating pipettes. Rinsing is accomplished by the movable tip principle.

For More Details Circle No. 31—Page 259

Air Vibrator: Cleveland Vibrator Co., 2828 Clinton Ave., Cleveland —Redesigned air vibrator for use on



bench applications requiring vibration is easily installed on bench with simple faceplate and bolts. A steel, U-shaped head functions as a vise to clamp the form or device to be vibrated. A serrated steel plate is incorporated in the head to assure

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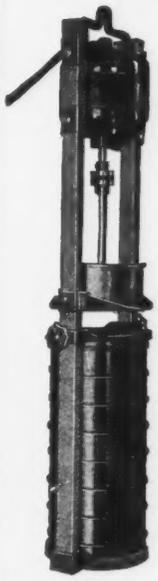
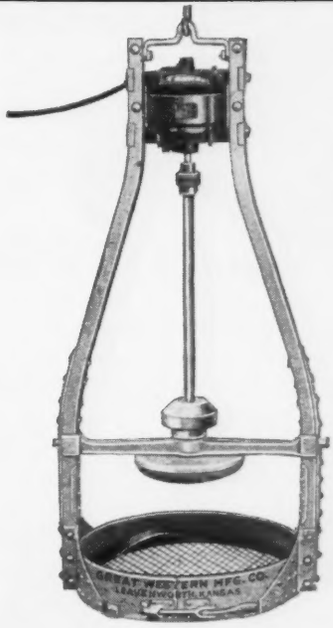


Type "HL" Lab Sifter for sand control $202.00 without sieves

Type "CS" with 24" square screen and automatic discharge $320.00.

Type "CR" with 24" sieve $310.00



Type "V"
With 20" sieve $250.00
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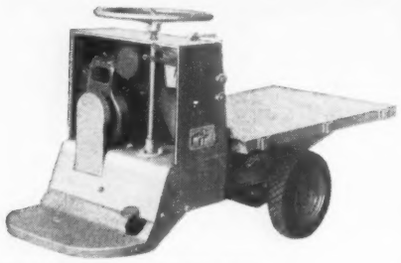

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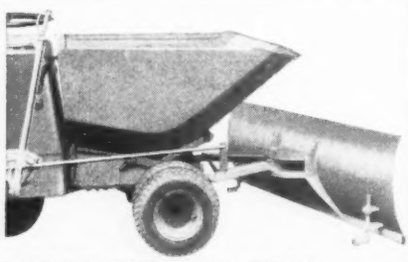
carries flasks, cores, large castings . . . has stake pockets for adding sideboards . . . tilts for easy pull-away when unloading. 32" width clears narrow aisles, doors.

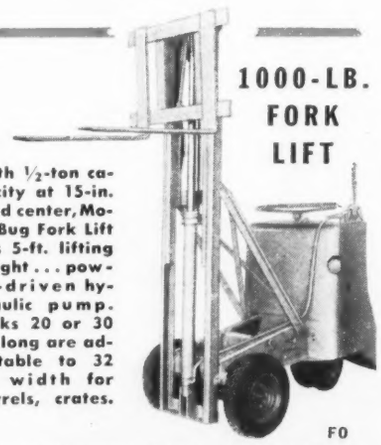
With 10 CU. FT. HOPPER

Kwik-Mix Moto-Bug delivers sand to mixers or molding stations, hauls castings from cleaning room to storage, handles coke and slag around ovens, cleans up scrap in shops and yards. This low-cost power wheelbarrow climbs 20% ramps fully loaded, turns in its own length . . . has instant gravity dump with snub-line control. With interchangeable flatbed platform, fork lift and scraper blade, Moto-Bug increases man-hour output on all material-handling jobs.



5-FOOT SCRAPER BLADE

clears snow, does leveling . . . can be attached without removing hopper. Blade sets at any angle, is supported by two swivel shoes, raises for travel clearance.



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With ½-ton capacity at 15-in. load center, Moto-Bug Fork Lift has 5-ft. lifting height . . . power-driven hydraulic pump. Forks 20 or 30 in. long are adjustable to 32 in. width for barrels, crates.

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Send us complete information on Moto-Bug with: ☐ hopper ☐ flatbed ☐ fork lift ☐ scraper blade

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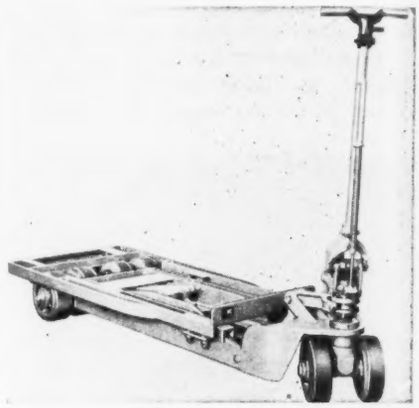
positive bite and rigid mounting. Area of the vise jaw is 7½ sq in. The machine is 8½ in. in overall length, 5⅛ in. wide and 3 in. high. The 1¼-in. piston diam size weighs 11 lb and the 2-in. piston diam size weighs 21 lb.

For More Details Circle No. 32—Page 259

Lift Truck: West Bend Equipment Corp., West Bend, Wis.—Double-framed lift truck with special spring suspension is especially designed for cushioning the load in such uses as handling green sand cores or in any other operation requiring careful handling. The truck has a spring-suspended frame superimposed on the lifting frame. Both are raised by the horizontal hydraulic lifting unit. Varying with the capacity of the truck, there are three or more sets of coiled compression springs on each side of the top frame, set in pairs and evenly spaced. Capacities available range from 2000 to 6000 lb.



For More Details Circle No. 33—Page 259

Safety Valve: Kelly Safety Device Co., 2196 W. 65th St., Cleveland—Automatic gas cutoff valve designed for use with natural and manufactured gas is intended primarily to be placed on gas supply line in front of gas meter. In the event of a fire, a fusible link made of B. F. Goodrich Chemical Company's Geon 404 plastic distorts at approximately 165°F and forces a tension spring to close the valve and thus prevent discharge of gas from a melted gas meter. Replacement links return the valve to operating condition. Average operating time for the valve to close at 200°F is about 2½ minutes.

For More Details Circle No. 34—Page 259

Charge Indicator: Gould-National Batteries Inc., Trenton 7, N. J.—Charge indicator for industrial truck batteries can be easily mounted

Foundry Refractory

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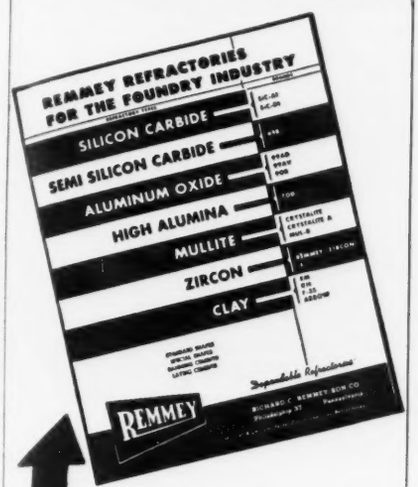
. . . Know the *right* refractory for the job!



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so that the operator sees the dial at all times. A three-colored dial has readings for full, ½ full, empty and danger. The indicator, a bridge type instrument, is readily adjustable for 3, 6, 12, 15, 18 and 24-cell batteries; a series of resistors and taps permits the desired adjustment. Completely enclosed in a metal case, the instrument is balanced to read accurately regardless of its mounting or the truck's position. A toggle switch disconnects the indicator from the battery during charge.

For More Details Circle No. 35—Page 259

Coloring Stick: Clearview Co., 177 Stanton St., New York 2—Coloring stick brings out stamped impressions or engravings on all smooth surfaces, regardless of type of material. Made in semisolidified form for application by wiping, it hardens in a short time and becomes permanent after use. Does not rub off or smear when handled and can be kept on work bench or table for intermittent application. In use, it is applied to surface and indentations, then rubbed off with a cloth, leaving paint in areas to be marked. Paint fill-ins expand and contract with parts and can be subjected to temperatures as high as 500°F.

For More Details Circle No. 36—Page 259

Hoists: Coffing Hoist Co., 800 Walter St., Danville, Ill.—Coil chain, ratchet lever hoist with ratchet and pawl operating principle now uses coil

instead of roller chain to permit chain to swing or wrap easily in any direction. When not under load, chain may be pulled freely through the hoist head for quick adjustment. The ratchet and pawl construction is said

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UNITED STATES RUBBER COMPANY

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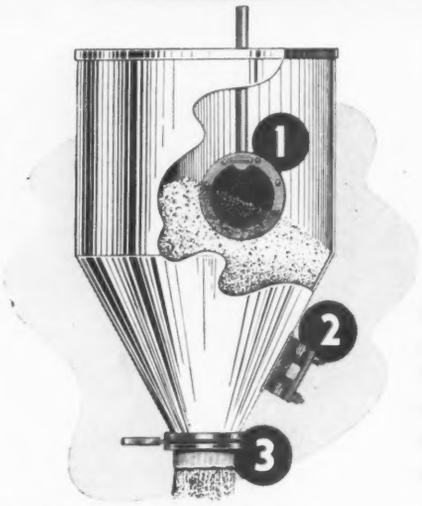

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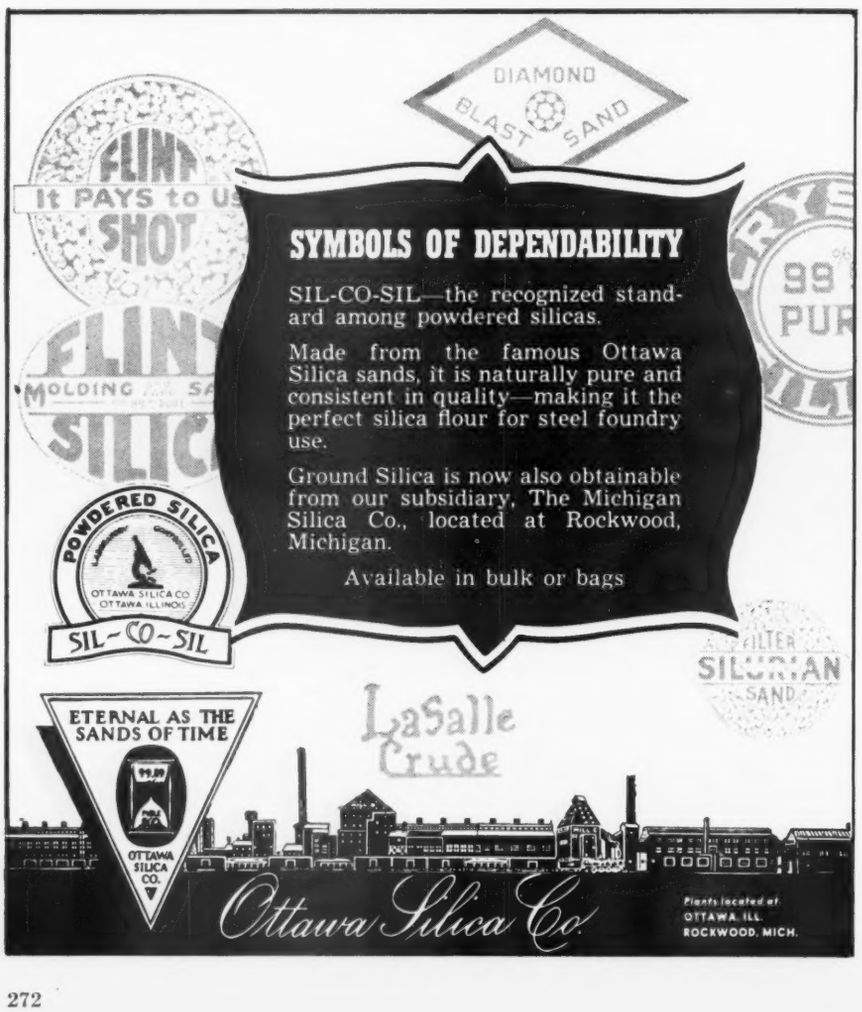
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Plants located at
OTTAWA, ILL.
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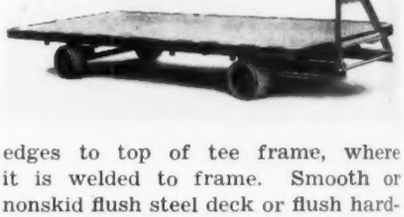
to eliminate the need for a friction brake, end load slippage and avoid freezing of the holding mechanism. The handle operates in any position. It can be operated with either partial or full strokes, and a safety stop prevents spinning. Hoists are available in 1500 and 3000 lb capacities.

For More Details Circle No. 37—Page 259

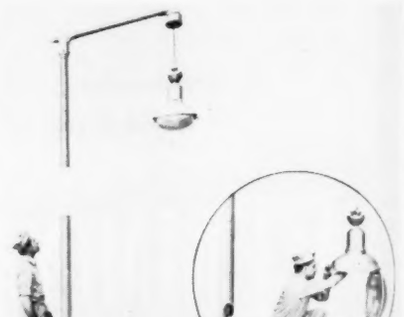
Trailer: Mercury Mfg. Co., 4044 S. Halsted St., Chicago 9—Trailer of 20,000-lb loading capacity rating is designed for dock and yard service. Deck is 7 ft wide by 14 ft long, but various lengths and widths are available. Height is 22½ in. Construction shown consists of 3/16-in. nonskid steel deck supported on multiple longitudinal sills and dished up at



edges to top of tee frame, where it is welded to frame. Smooth or nonskid flush steel deck or flush hardwood deck is optional. Heavy cast steel wheels are bearing mounted on 2¾-in. diam axles and fitted with 8 x 15-in. pressed-on solid rubber tires. A long loop handle drawbar affords easy steering and maximum maneuverability. Rear of trailer is fitted with a safety "C" type coupler.

For More Details Circle No. 38—Page 259

Pole-top Unit: Thompson Electric Co., 1173 Power Ave., Cleveland 14—Pole-top unit which incorporates disconnecting and lowering hangar mechanism makes possible safe, ground-level maintenance for lights mounted on new standard metal poles

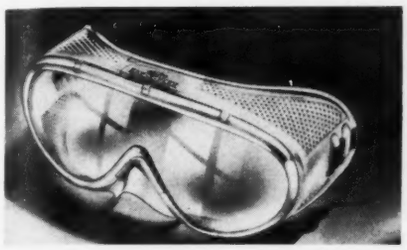


of any height. Maintenance men work at ground level with "dead" fixtures because the live contacts stay at the tops of poles. The unit in-

cludes a pole-top fitting complete with self-contained pulley, a divided mast-arm, stainless steel operating cable and a mast-arm end fitting.

For More Details Circle No. 39—Page 259

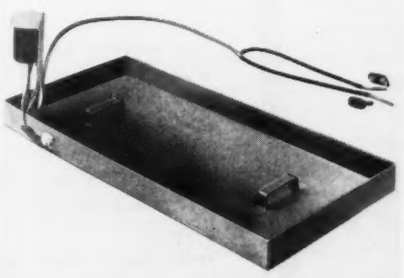
Goggles: United States Safety Service Co., 1215 McGee, Kansas City 6, Mo.—Plastic safety goggle has newly designed frame of pliable vinyl



with rolled edges where it contacts the face and with new type grid ventilation for comfort and freedom from fog. Lens can be easily and quickly changed. It locks securely into frame channel at seven points and is optically correct. Goggle weighs 1.7 oz and fits over the widest type of personal glasses. It is said to exceed federal specifications for impact resistance and strength.

For More Details Circle No. 40—Page 259

Saw Converter Kit: Robert G. Evans Co., 6315 Brookside Plaza, Kansas City 5, Mo.—Dry cutting masonry saws can be converted to



wet cutting in 5 minutes with the use of a conversion kit which consists of a steel reservoir for water, an electric pump for recirculating water, machine tubing and spray nozzles with inset holders and a canvas backdrop. Different models are available for different sized saw frames.

For More Details Circle No. 41—Page 259

Temperature Indicator: Thermo Electric Mfg. Co., 480 Huff St., Dubuque, Iowa — Combination temperature indicating pyrometer and millivoltmeter is designed to be easily portable and to operate with close accuracy. Long thermocouple leads permit temperature checkings up to 8 ft from instrument and in places

You name the material, the surfaces and the conditions under which they are to be marked and you'll find a Markal Paintstik that will efficiently do the job. In those rare cases where conditions are out of the ordinary and no stock Paintstik is available, one will be developed to meet your needs.

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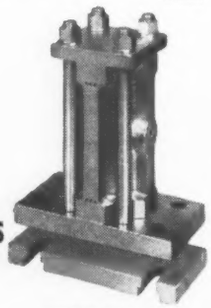

STYLE "EM"
Piston Diameters: 1¼" to 5"
Vibrator Weights: 12 lbs. to 180 lbs.

STYLE "A"
Piston Diameters: ⅜" to 2"
Vibrator Weights: 1 lb. to 11½ lbs.

STYLE "B"
Piston Diameters: 1" to 2"
Vibrator Weights: 4½ lbs. to 25 lbs.

CANNON VIBRATOR COMPANY
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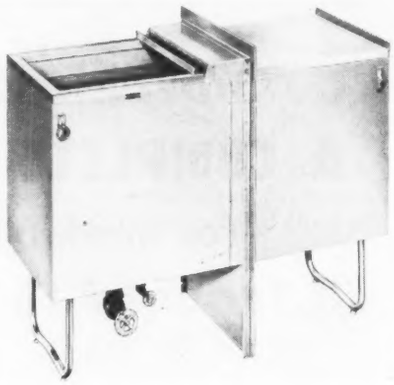
not readily accessible. Pyrometer scale is 3¾ in. long and mirrored. Three scale ranges are available, with calibrations for Fahrenheit and Centigrade temperatures and for millivolts: 800°F, 430°C, and 17 mv; 1600°F, 865°C and 36 mv; and 2250°F, 1225°C and 50 mv. Automatic compensation for internal resistance changes due to variation in ambient temperature is said to provide accuracy within 1 per cent.

For More Details Circle No. 42—Page 259

Pass-tank: General Electric Co., 4855 Electric Ave., Milwaukee 14—Stainless steel pass-tank enables users of x-ray film to place in an adjoining room the supplies, films and equipment that often jam darkrooms,



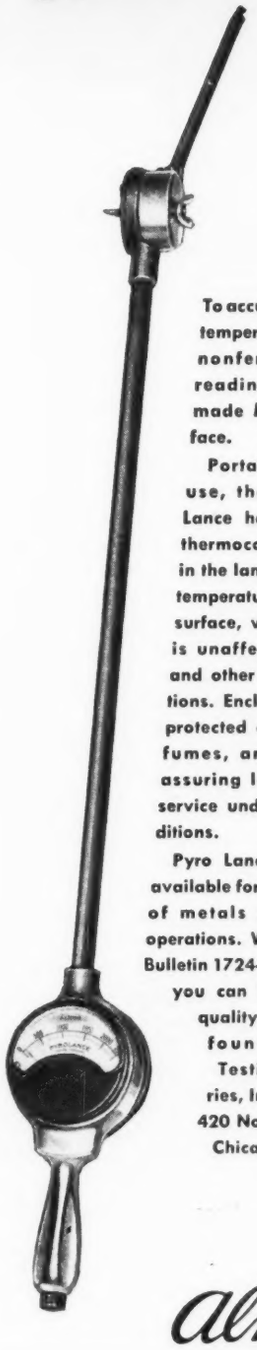
thus making possible the viewing of wet films, loading and unloading of driers, unloading of hangars and cutting of film corners in a room outside the darkroom. The tank may be installed through the wall as a water pass with one half in the darkroom, the other in the adjacent light room. It is lightproof because of a replaceable rubber strip over the space between the covers. Easily disassembled for cleaning, it is available in 30-in. and 48-in. inside length sizes and in left to right or right to left processing.

For More Details Circle No. 43—Page 259

Roof Coating: The Monroe Co. Inc., 10703 Quebec Ave., Cleveland 6—An aluminum-asbestos roof coating reputedly lowers interior building temperature 15 to 20°F and permanently prevents roof deterioration. The coating is made of aluminum flakes, asphalt and asbestos suspended in a waterproofing oil vehicle. Reportedly the aluminum flakes "leaf" over the top of the asphalt and asbestos to form a metallic shield which reflects hot sun rays, seals out moisture, and is impervious to rust, corrosion and fumes. The coating is recommended for all applications where under-roof temperatures must be kept to a minimum.

For More Details Circle No. 44—Page 259

in nonferrous foundries SURFACE INDICATIONS CAN BE MISLEADING



To accurately measure temperature of molten, nonferrous metals, readings should be made *below* the surface.

Portable, handy to use, the Alnor Pyro Lance has a protected thermocouple mounted in the lance tip—it takes temperatures below the surface, where accuracy is unaffected by dross and other surface conditions. Enclosed couple is protected against flame, fumes, and corrosion, assuring long, accurate service under severe conditions.

Pyro Lance models are available for a wide variety of metals and foundry operations. Write today for Bulletin 1724-D and see how you can have low-cost quality control in your foundry. Illinois Testing Laboratories, Inc., Room 511, 420 North LaSalle St., Chicago 10, Illinois.

Alnor

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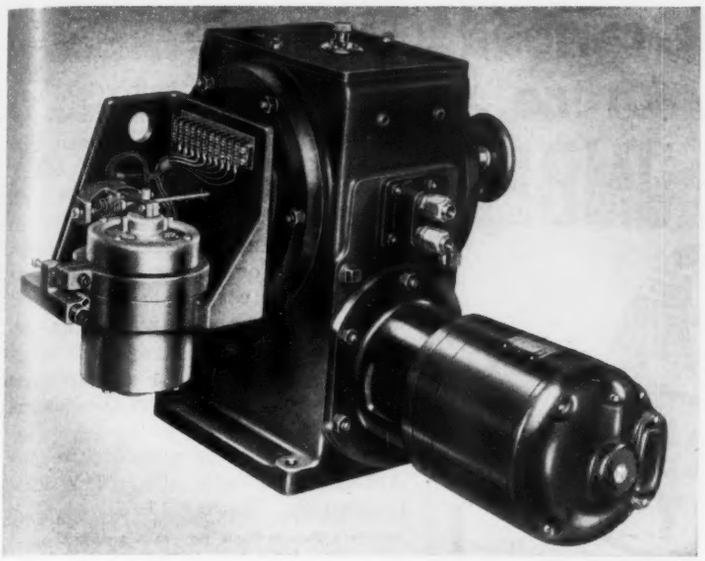


This automatic air-weight control combines electrical power measuring system with standard hydraulic control equipment

When delivered and desired air-weight do not balance, blast gate opens or closes to adjust weight

AUTOMATIC AIR-WEIGHT CONTROL Increases Cupola Efficiency

By PAUL GLASS, *Research Engineer*, Askania Regulator Co., Chicago

FOR efficient cupola operation, high iron-to-coke ratio and consistent quality of castings, air delivery must be controlled to constant weight. Control to constant volume is not enough, since changes in atmospheric pressure and temperature change the air density and make a pronounced difference in the mass of useful oxygen per cubic foot.

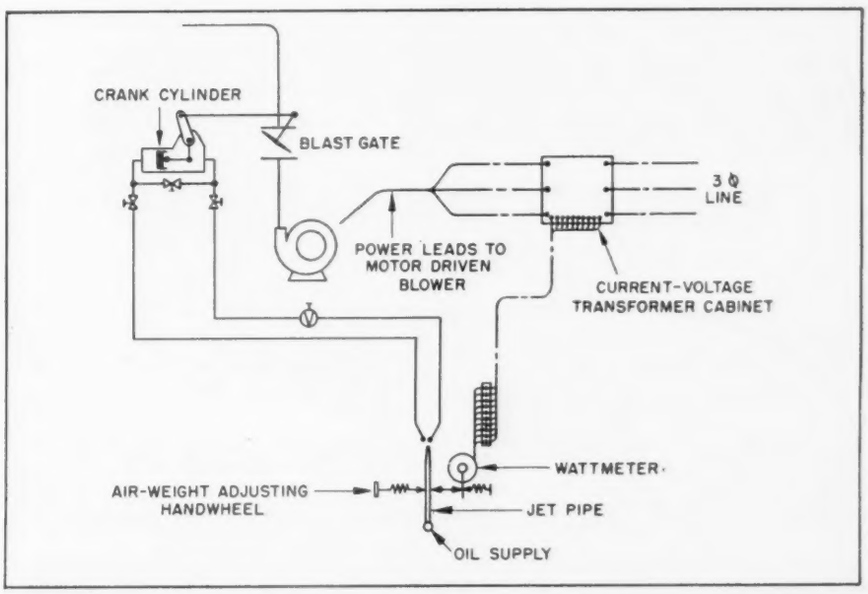
Motor-driven blowers are available with characteristics suited for constant air-weight control. In these units the air-weight delivered by the blowers is directly proportional to the power consumed by the driving motor. Thus, if the power supplied to the blower motor is measured continuously, this measurement is a suitable signal for automatic control of air-weight.

The principle described above is the basis of an automatic air-weight control which combines an electrical power measuring system with standard hydraulic control equipment. The measuring system is a wattmeter which resembles a torque motor with a three-phase stator and a three-phase rotor. When the stator is energized in proportion to the three-phase current flowing to the blower motor and the rotor is energized by the three-phase motor voltages, the wattmeter develops a torque proportional to the power input to the blower motor. Actually the "rotor" does not rotate in the ordinary sense. Instead it moves through only a small angle. This makes possible the use of flexible leads to the rotor instead of slip rings and brushes.

The torque developed by the wattmeter is opposed by a spring force that can be adjusted by a handwheel on the opposite side of the regulator. The handwheel scale is calibrated directly in units of air-weight delivery.

Between the wattmeter and the opposing spring a jet pipe relay directs a high velocity stream of oil at two closely adjacent orifices in the distributor block of the regulator. These orifices are connected to opposite ends of a hydraulic cylinder. It, in turn, is coupled to the blast gate.

When the actual air-weight delivered by the blower equals the desired air-weight as set on the handwheel scale, the force developed by the wattmeter exactly opposes the force of the balancing spring, and the jet pipe is at its center position. The recovered oil pressures in the two receiving orifices are equal, and the pressures on the opposite sides



This diagrammatic view illustrates the operation of the control system

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of the piston are equal. So the piston and the blast gate remain stationary.

But if the delivered air-weight and the desired air-weight do not balance, the jet pipe will move toward one orifice and away from the other. This makes an unbalance in the oil pressures to the power cylinder so the piston moves and the blast gate opens or closes the amount necessary to correct the air-weight delivery. When the air-weight delivery is again at the desired value, the jet pipe is again centered on the receiving orifice, and the control is in balance.

The equipment is manufactured by Askania Regulator Co., 240 East Ontario St., Chicago 11.

For More Details Circle No. 45—Page 259

Air Force Procurement Guide Is Revised

A revised version of "A Guide for Selling to the United States Air Force," the handbook for firms which desire to do business with the Air Force, is ready for distribution. Latest changes in procurement procedures, including the effects of decentralization on Air Force buying, have been incorporated in the new edition.

Decentralization of procurement functions from Wright-Patterson Air Force Base, near Dayton, O., to field installations throughout the country is discussed, and a complete list of the procurement functions which have been moved to depots and Air Materiel Areas is included. Central and local procurement, special procurement methods, small business and subcontracting also are covered.

Copies may be obtained at any of the Air Procurement district and regional offices or from Commanding General, Air Materiel Command, Wright-Patterson Air Force Base, Ohio: Attn: Industrial Relations Section, MCPAXC-1. There is no charge.

Claud S. Gordon Expands

Claud S. Gordon Co., 3000 South Wallace St., Chicago 16, has opened a new manufacturing plant on a 6½-acre site at Richmond, Ill. New machinery has been installed for the manufacture of thermocouples, pyrometer accessories, specialty instruments and metallurgical testing machines. New facilities also include a complete insulating mill for the application of insulation to all types of thermocouple and extension lead wire. The home office and the headquarters for the engineering and service departments will remain at the Chicago plant.

Making the Foundry Safe

(*Continued from page* 123)

be used, and that's a matter of personal adjustment between the man and his work, and his emotional attitude toward his work. Human nature must be considered in any program designed to make the foundry safe.

Many a supervisor or foreman has heard the complaint, "These goggles are too hot," as the worker pushes them up on his forehead, or removes them and hangs them on a hook. Or perhaps, he says, "I can't see through these things. They fog up on me." It may be that he has a short job to do and doesn't want to be bothered putting on his goggles. He'd rather take a chance.

Training workmen in the use of their safety equipment is a slow and often a discouraging process, but it can be done, and is done in those foundries which have good safety records. There are many ways to approach the task. The following suggestions are just a few that may work for you — as they have for others.

1. *Be sure to select comfortable equipment*—Make certain that each man's goggles or respirator fits him and that it is designed for the work. See that he has the proper bridge and lens size, and have the plant optician or safety director fit the goggles.

Filter respirators for shakeout work should provide low breathing resistance for greatest comfort. Usually ease of breathing is related to filter area, but it's best to choose an efficient Bureau of Mines approved respirator rather than an unapproved respirator with a gauze filter and less breathing resistance. It must be remembered that protection is paramount. Again, fit is important and the respirator should fit the various types of facial contours without leaking.

2. *Use a dramatic method to present the need for safety equipment.* —Birdsboro Steel Foundry & Machine Co. has developed an ingenious way. The safety director carries a glass eye in his pocket. Whenever he sees a workman without his goggles, he taps him on the shoulder, holds the glass eye before his face and says, "I can order one of these in your size." The goggles are pulled down or put on in a hurry.

Many plants hang a well-worn goggle on the bulletin board or in a conspicuous place in the foundry. Any man who has seen the way a goggle becomes pitted from emery particles or welding metal, in a short

Service Unlimited

Rely on Hickman, Williams to "go all out" to make on-schedule deliveries of the basic foundry commodities listed here.

Remember too, "One call gets them all."

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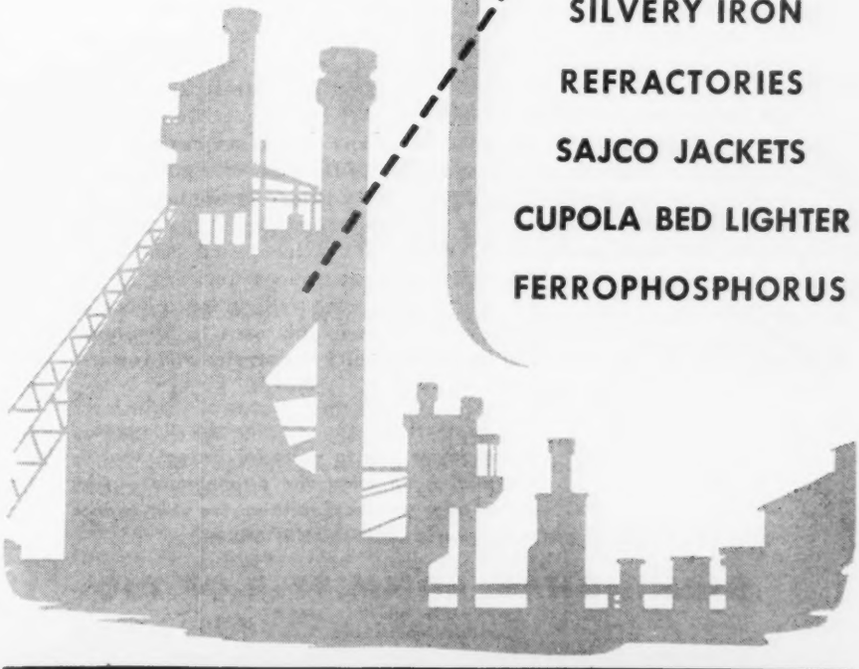
CUPOLA BED LIGHTER
FERROPHOSPHORUS



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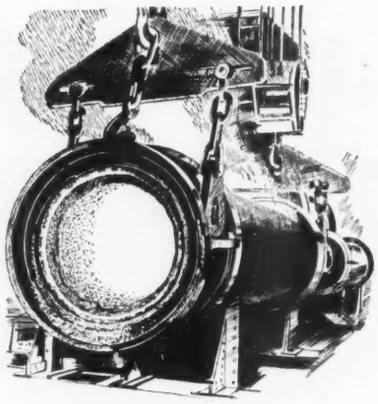
Here's Another "Pipe Dream" That Came True in the BIRMINGHAM DISTRICT



In this central district of the Southeast, six huge pipe plants produce 60% of the Nation's cast iron pressure pipe. Typical of the district's great pipe plants that have advanced from small beginnings to the front rank of American industry is the—

AMERICAN CAST IRON PIPE COMPANY

Availability of pig iron primed the Company's establishment in 1905. Widespread building of waterworks and sewage disposal plants throughout the U. S. A. broadened its markets. Birmingham's strategic location as a distribution center and cooperative and efficient labor played a major role in its growth. These have been reinforced by a progressive management which pioneered the centrifugal "Mono-Cast" pipe spinning process and added recently extensive new facilities for making cast steel parts, tubes and industrial alloys. These find a market throughout this country and abroad. Many of "Acipco's" steel and alloy iron castings are finished for end use at its own plant. Because of limited open facilities in the Birmingham district for finished machining, a substantial tonnage of castings is shipped to machine shops in other States for final processing. Officers of "Acipco" and other Birmingham enterprises look forward to the day when many more well-equipped machine shops will locate in this area to fill a need and find opportunity for service and reward.

★ ★ ★ ★ ★ ★

Members of the Birmingham Committee of 100 invite you to write for factual, specific information on what the Birmingham district has to offer you as a location for your branch plant, warehouse or sales office.

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time will hardly like to expose his eyes to the conditions that cause pitting. The goggle serves as a reminder to wear the goggles, and it also serves as a warning to those who don't.

3. *Bulletin board posters*—In many foundries colorful bulletin board posters show the results of not using safety equipment. Safety equipment manufacturers make these posters available to plant safety directors or supervisors on request.

4. *Education*—Regular safety meetings, on company time, where movies are shown on the correct way of doing the job, or some safety feature is demonstrated, or the men make safety suggestions, are part of the accident prevention program in an increasing number of plants. That they pay is shown by the plant's improved safety record, and lessened compensation costs.

5. *Supervision* — There's a trend among management men to place the responsibility for safety where it belongs—directly on the men. Every help is given them to develop proper working attitudes, to acquire skill, and to prevent accidents. Then they are expected to use that help wisely and well. The safety engineer, foreman, or supervisor is usually designated to see that they do, and it is his job to administer discipline if the accident has been caused through an improper attitude on the part of the workman, such as deliberate chance-taking or disregard of instructions. If the accident is due to lack of knowledge or skill, the supervisor should institute job analysis and job training methods.

6. *Discipline*—In some places an important part of the safety program is a clear-cut understanding by the employee that safety equipment must be worn as a condition of working in the plant. No use of safety equipment—no job. Although discipline is not very popular, statistics show that where companies can and do use discipline for safety rule infractions the policy has paid off in fewer accidents.

7. *Maintenance*—Many of the complaints about wearing safety equipment can be reduced or entirely eliminated if the equipment is chosen with due care for the wearer's comfort, and is kept in first-class condition. It's important to keep personal safety equipment clean by regular reconditioning, washing, and sterilization.

Protective equipment should be stored in a clean, cool, dry place when not in use to retard deteriora-

tion of rubber parts. All parts, with the exception of canisters and cartridges in the case of respirators, should be cleaned after each use. Filters and cartridges should be replaced and the used ones discarded. Respirators and goggles should be sterilized before being passed from one employee to another.[5]

There are no complicated rules to follow in setting up and maintaining a good safety program in the foundry. All that is required is proper equipment; a genuine concern for the worker's safety; discipline, and good common sense. With these assets, freely given and freely and constantly used, any foundry is eligible for a better safety record and for its concomitants—healthier, happier, workmen and greater production of good castings.

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2. Reported in *Southern Power and Industry*, W.R.C. Smith Publishing Co., Atlanta, October, 1951.
3. Reznick, Louis—*Eye Hazards in Industry:* N. Y., 1941, Columbia Univ. Press for the National Society for the Prevention of Blindness, pp. 111-146.
4. *Industrial Safety*, edited by Roland Blake. New York: 1943. Prentice-Hall, pp. 363-366.
5. *Accident Prevention Manual for Industrial Operations.* Chicago: 1946, National Safety Council, pp. 430-432.

See also "Foundries," Safe Practices Pamphlet No. 73, National Safety Council, Chicago, 1941, for a discussion of the hazards incident to layout, machinery, and housekeeping.

British Metals Group Meets at Oxford

British Institute of Metals held its 44th annual autumn meeting in Oxford, Sept. 15-19, under the chairmanship of Dr. C. J. Smithells, president of the institute. Prof. H. W. Swift, M. A., D. Sc., professor of engineering, University of Sheffield, opened the meeting at the Sheldonian Theater, when he delivered the 23rd autumn lecture, "On the Foothills of the Plastic Range."

Twenty-five papers covering metallurgical research on nonferrous and light alloys and metals were discussed at four scientific sessions. Two series of papers centered around specific themes, one around "Equilibrium Diagrams and Theory of Copper Alloys," the other around "Equilibrium Diagrams and Theory of Alloys of the Transition Metals."

Visits were organized to the Atomic Energy Research Establishment, the research laboratory of Associated Electrical Industries Ltd., the laboratories of Northern Aluminum Co., Ltd., Morris Motors Ltd., and their associated companies, M. G. Car Co. Ltd., Riley Motors Ltd., Pressed Steel Co. Ltd., the locomotive and wagon works of British Railways at Swindon and to the colleges of Oxford.

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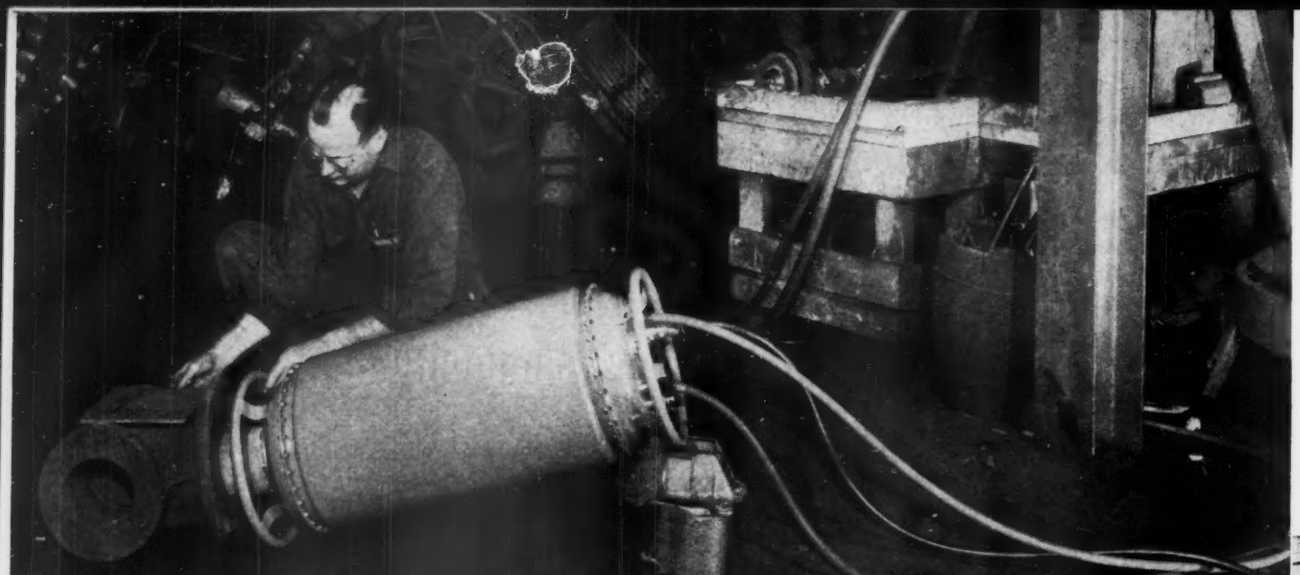


Application of the x-ray unit in a foundry. "Snout" is inserted into casting, film placed on the outside

PORTABLE X-RAY UNIT

Has 250,000-Volt Capacity

A NEW development in the field of portable x-ray equipment by the General Electric Co., X-Ray Department, is a "pint-size" unit that nevertheless has an output of 250,000 volts. Only two men are required to accomplish a setup for radiography.

Less than 15 inches in diameter and 44 inches long, the unit is 56 per cent smaller in size than the conventional 250,000-volt x-ray machine. Its weight is one-eighth that of conventional apparatus—only 150 pounds as compared with 1150. As a result, the x-ray unit can be brought to the product.

Capable of inspecting 3½ inches of steel, the new unit can be used in welding shops or foundries, or may be carried out "on location" for such projects as ship, dam, and powerplant building, testing oil refinery cracking towers, laying pipeline, bridge construction, and any other construction work, where the soundness of welded seams is essential.

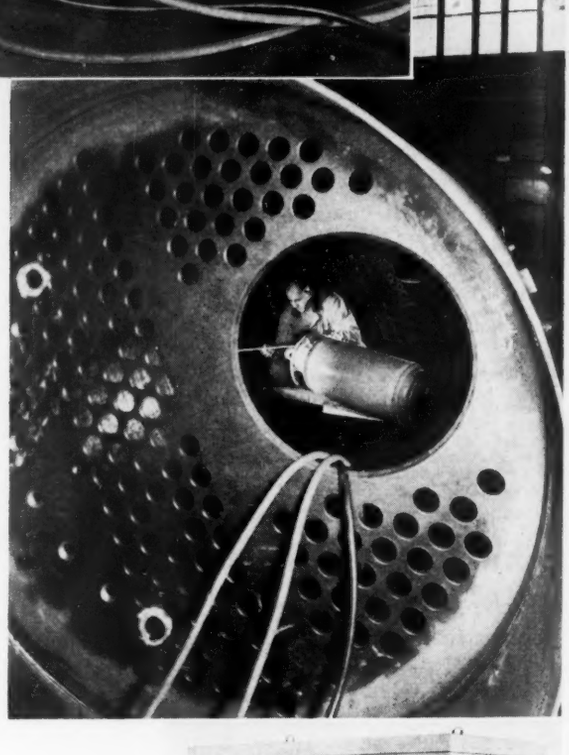
The first major application for the unit has been in several U. S. Navy shipyards, where it is inspecting critical welded seams and stressed areas during and after ship construction. The Navy apparatus is consolidated onto a 6-foot, two-wheel trailer—complete with 200-foot extension cables, the transformer, power supply and other accessories.

The new unit is adapted to inspecting products made of everything from magnesium to steel. Its use on light metals is possible, operating at lower voltages, because of the x-ray tube's beryllium window (x-ray exit port) which allows the "soft" or less-penetrating rays to "escape" from the tube instead of being absorbed as they are by other types of windows.

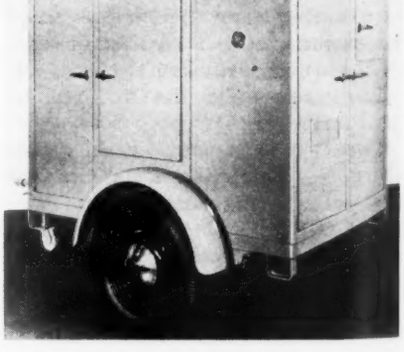
Secret of the size and weight reduction is the use of a high-frequency, resonant transformer. This eliminates the need for the closed iron core ordinarily used in transformers for industrial x-ray units of this voltage. Another contributing factor is the use of gas insulation instead of heavy oil.

Responsible for the unit's versatility is the multi-section x-ray tube that is grounded at the end. By thus providing protection from a 250,000-volt shock, this tube design makes possible letting the "snout" or x-ray source end of the tube protrude from the end of the tank. The snout can be inserted inside of castings to use the "inside-out" technique that greatly speeds the process of x-ray inspection and reduces the problem of x-ray protection to the operators.

In setting up for the inspection of



Tube head of the machine can be passed through a 15-in. diameter opening. Two men can handle it



Trailer in which complete unit is carried, including power supply, 200-ft cable, tube-transformer head, storage cabinet for accessories

a welded joint connecting two sections of a pipe, for example, the x-ray technician can bring the x-ray unit inside the pipe and change its position for each exposure area without disturbing the pipe. He can also use it inside large castings and other areas difficult of access, or insert the snout inside a smaller casting, as shown in the accompanying illustration.

Known by the trade name Resotron 250 (resonant transformer rated at 250 kv), the unit is operable throughout the 75 to 250 kv range from either a 220 or 440-v, 3-phase, 60-cycle supply, and from 2 to 10 ma in tube current. It can be operated in temperatures of from 35° below zero to 100° above zero, and in humidities up to 100 per cent. The entire assembly is weather-tight to enable outside storage.

The trailer cabinet in which the assembly's three basic components are mounted (power unit, cable reel and storage housing) is 4 x 6 x 4 ft high.

The tube head is small enough that it can be passed through a 15-inch-diameter opening and light enough that it can be easily handled by two men. Rings at either end facilitate handling, rigging, and storage.

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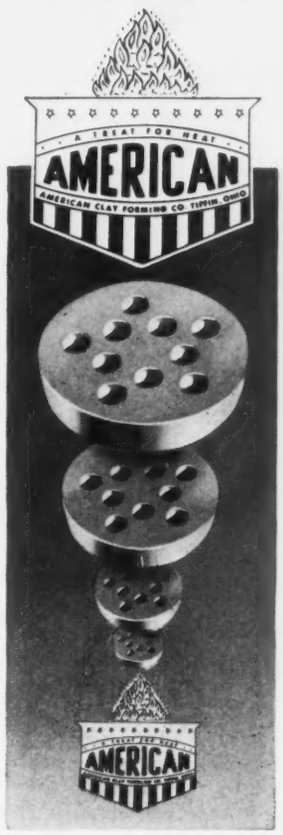

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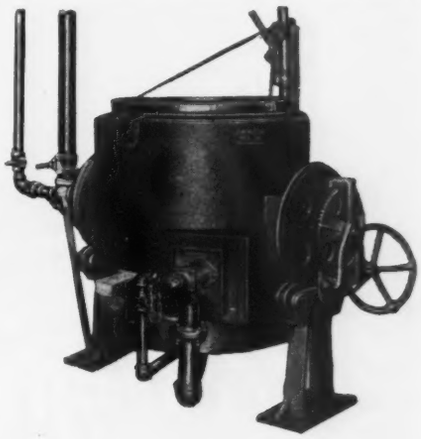

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Shell Molding

(*Continued from page* 107)

are mixed in an unfamiliar combination. Besides the differences observed between sands and resins, the proportion of each is another variable, and general statements may be made concerning the ratio of one to the other.

As the proportion of resin is increased from, say, 5 per cent, the surface of the mold will become smoother, shinier and harder. These characteristics are not always transmitted to the casting. As the resin content exceeds a certain critical percentage (different for each combination of sand and resin) the danger of penetration and scabs increases. The flowability of the sand-resin mix increases generally with the resin content. Although a high content of resin produces a harder mold, it is also more brittle and the danger of breakage increases. A high resin content also means an increased danger of blow holes. As the proportion of resin is decreased from about 5 or 4 per cent, the molds are weaker, more inclined to crumble and have a rougher, more porous surface. The surface of the resulting castings approaches that of a casting produced by conventional green sand method.

Used in Small-Scale Production

The material given below shows characteristics observed when these combinations were used in small-scale production. (In each of the following the resin content is from 5 to 7 per cent of the sand by weight).

1. 155 Mesh Sand and Type A Resin—In this description this mix is considered the standard. The various qualities of this combination may be considered "average."

2. 155 Mesh Sand and Type B Resin—The molds produced by this mix have unusually smooth finishes which are in part reflected by the castings. A relatively slow-baking mix, it seems to cause eyewatering more than other combinations. Although a strong smell is frequently associated with this combination, it is not unpleasant to the operator.

3. 60 Mesh Silica Sand and Type A Resin—The molds produced by this combination have a rough, porous finish, and hold up well with extreme thinness (actually transparent shells have been produced). Molds are very tough and hard, but considerable penetration has occasionally been observed in castings.

4. 107 Mesh Sand and Type A Resin—This combination is notable

for an extremely short cycle even at low temperatures. Successful castings have been made from patterns baked only 30 seconds. In the first batch received from the supplier, it was observed that a considerable amount of foreign material was present in the sand. This may or may not account for the short baking periods required. The finish on castings was quite satisfactory, although cores produced under low pressure seemed to crack rather easily. The back of molds was much smoother than is usually observed, and a somewhat mottled surface is typical of the molds. On no occasion did any mold fall from the pattern although the pattern temperature on experiments using this sand ranged from 275 to 500° F. Here again the foreign material present may have played a part.

5. 139 Mesh Sand and Type A Resin—A tough, smooth finish results from this combination. However, considerable difficulty is encountered in stripping the mold from the pattern, and release agent had to be applied more frequently and in greater amounts than is usually the case. Although finishes of castings were only of an average smoothness, the features on the face of the mold were exceptiona'ly well defined. On the basis of this experimental work it is assumed that a smaller resin content is required when this sand is used.

6. 155 Mesh Sand and Type C Resin — Unsatisfactory results were obtained from this combination. In particular, a sandy finish which crumbled easily was observed. On those occasions where a smooth finish was obtained, it was noted that the surface was sometimes brittle and somewhat separated from the body of the shell. Under direct flame the mix seems quite satisfactory (except for the finish) and does not blacken as readily as other combinations. It is assumed that a higher concentration of resin is required here.

7. 161 Mesh Silica Sand and Type A Resin—An extremely smooth surface on molds and generally satisfactory castings were obtained when this combination was employed. This mix is almost as quick-setting and baking as that shown under Item No. 4. An objectionable odor was frequently encountered here and the shells were not as satisfactory as those made as indicated in Item No. 4.

Other combinations of sand and resin have occasionally been tried, but the seven listed above have been the only mixes used extensively.

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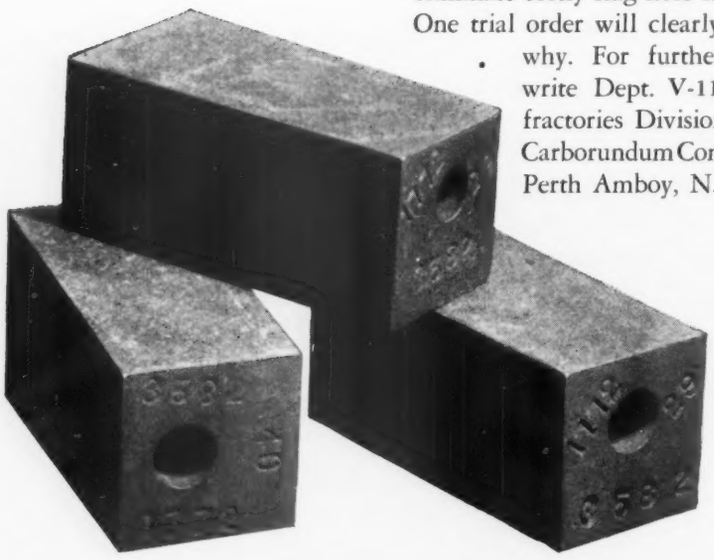

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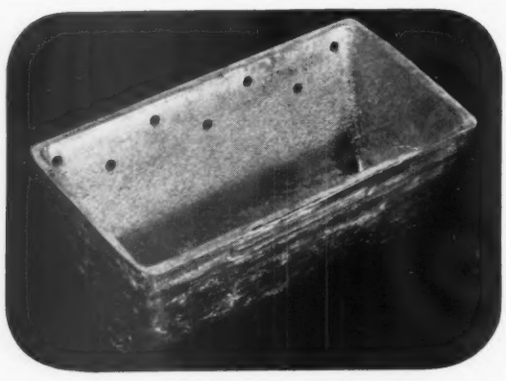

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The sand and resin are mixed for laboratory work with a conventional muller. A tumbler type mixer may be used. Fifteen minutes to a half-hour has been used as a mulling time. Manufacturers of certain resins recommend that a wetting agent be used to facilitate mixing. Dust suppressants are now available to minimize resin dust formation.

In general, it may be said that a finer grained sand produces a smoother finish (although many other factors also determine smoothness). Mixes of one type may be mixed with another type with no noticeable bad effects, although the characteristics of the component parts are not necessarily retained in the blending. There is usually a rather considerable amount of sand left after the required number of experimental molds are made from a given batch. If it is desired to change to another mix it is not usually necessary to discard the left-over portion, but rather it may be stirred in with the new batch.

Our experience to date indicates that an angular or subangular grain sand with an average fineness of about 100 mesh and grain distribution over four screens is desirable from the viewpoints of results obtained and cost of sand. A practical range of plus or minus 10 per cent is permissible, or from 90 to 110 mesh average size.

Tests on tensile properties of various sand-resin mixes using 1 x ¼-in. tensile specimens indicate that a minimum baked or cured tensile strength of 300 psi is needed for 3/16-in. thick shells of 15 x 16-in. size and that a minimum of about 450 psi is needed by shells 26 x 41 in.

A number of resins produced by various manufacturers have been tried. All were found to form shells about equally well. Due to the urgency of other problems in the development of the process we have not as yet set up a standard "test bar" method for measuring the efficiency of various resins.

Making Shells and Cores — When the heated pattern is prepared with coating and release agent the operator is ready to begin the cycle. The face of the shell will be formed by the mix which first touches the pattern and this is perhaps the only situation in the entire cycle where skill is required, and this skill is needed only when manual methods of contact are used.

If a dump box is used as in experimental or job-shop use, the operator clamps the heated pattern to the open top of the box (Fig. 2) and, as

quickly as is possible, causes the box to be inverted so that all the mix contained in the box falls upon the pattern. The box is held immobile in this position for as many seconds as desired and then inverted to its original position. A layer of the mixed sand and resin has adhered to the pattern of a thickness determined by the length of time the mix is permitted to remain in contact with the heated pattern (and to a much lesser extent by the heat of the pattern) and the excess mix has fallen off. The pattern covered with the formed shell is unclamped from the box and is ready for the next stage.

In this method it is extremely important that the frame of the box, or that portion against which the pattern rests, be clean and free from any remains from previous cycles. It is recommended that a habit be made of cleaning this frame immediately after the pattern is removed and while the cycle is in another stage. Unless this precaution is observed the danger of a mold falling from the pattern at the second inversion is needlessly great. At times a little release fluid applied to the frame may be advisable.

Other dangers at this point include ridges or hollow lines in the face of the shell and incompletely formed projections in the shell caused by (1) a too-slow first inversion and (2) an insufficient amount of mix in the dump box. To insure an even thickness (and incidentally a better appearance of the reverse side) it is advisable to complete the second inversion with dispatch or, if possible, continue the direction of rotation of the first inversion.

Hand dumping may be used for experimental shell making. Here, if it is not possible to provide a steady flow of the sand-resin mix to the pattern, quickness in applying successive amounts of the mix is all-important. The occasions when this method is necessary include times when it is desired to use up a small amount of mix, when there is difficulty in reaching all parts of a pattern, or when it is required to make a mold from an odd-sized pattern. In addition, it is sometimes necessary to add loose pieces to a regular pattern, and in such a case an inversion of the pattern is clearly impossible. After the mix is applied to the hot pattern the excess mix may be removed by an inversion, or by simply brushing it off.

Coremaking—At the time of writing, neither a shell core blowing machine nor a shell core machine has been designed or built. The nine or

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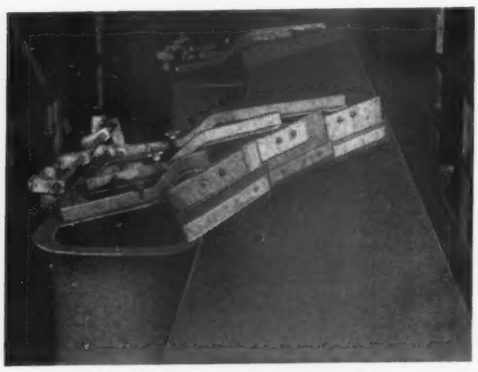

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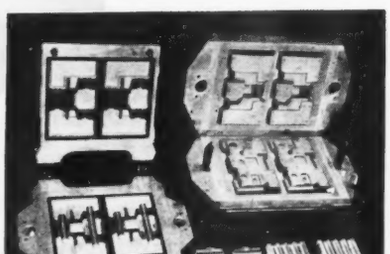

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so foundry machine builders actively engaged in producing or designing equipment for the shell process have confined their efforts to machines designed to produce shells for molds only.

Adaptation of conventional core blowing equipment has been carried out on a limited scale. Conventional core blowers have been employed successfully to make cores which, with suitable adjustments, might also be used to make acceptable shells. In blowing cores the corebox must be constructed with a sand inlet as large as physical considerations permit, and the very essential air outlets must be located so that air may be exhausted and excess sand-resin mix may be ejected. A cap of some sort is placed over the outlet hole and the corebox placed under the core blower's magazine.

To Obtain Hollow Core

The first blast of air sends the mix to all parts of the inside of the core box, but also fills up the box with excess mix. If the stage is stopped at this point the resultant core will be solid, an undesirable condition from a cost standpoint as well as because of the greater difficulty at shakeout. To obtain a hollow core, then, the cap at the outlet hole of the corebox is removed, a second blast of air pushes out the excess mix and the corebox is ready for the next stage. It is best practice to apply rather low pressure of air for the first blast—say, 20 to 30 psi—and to use about the same pressure for the second blast. If the full cartridge is replaced by an empty one before the second blast, a cleaner inside surface will result. Blowing air against sand-dry resin mixes tends to separate the resin from the sand and cause it to segregate.

Two methods have been proposed for preventing separation of resin from sand. One is to coat sand grains with resin previously dissolved in alcohol. This involves drying the sand-resin mix after treatment with resin solution, but the method has not proved practical. The other method proposed is the use of wetting agents; it may be practical but is not yet proven.

In making shell cores by methods other than blowing, either hand dumping or mechanical dumping of the sand-resin mix may be employed. The data presented here on coremaking apply largely to experimental equipment since, as mentioned before, no production shell coremaking equipment is yet available.

In using hand dumping of the mix, a hand scoop may be used. If, as

may be necessary, separate dumpings are needed to fill completely all cavities. care must be exerted to prevent some surfaces from receiving a small overflow from one dumping before they receive the full dumping directed to them. If this precaution is not observed, ridges will result in the completed core which invite penetration or scabs in the casting. Several methods are available to insure this controlled flow. At this time the best method seems to be to fit templates into the corebox so that the flow from one section to another is prevented. These templates should be designed for easy removal and further fitted to be present at ridges or other definite lines in the corebox. If this latter point is not observed, small lines occasionally appear in the finished core. Both methods outlined in this paragraph permit easy second dumping to eliminate the excess mix.

Two controllable variables determine the thickness of the final shell. These are the heat contained in the pattern at the time of contact and the amount of time the full amount of mix is permitted to remain in contact with the pattern. Of the two, the time of contact is by far the more important.

Make Thinnest Shell

The objective of the operator is to make the thinnest shell that can be used. Maximum economy in materials used and minimum time consumed per mold produced are dependent upon thinness of shell. The time saving is multiplied throughout the cycle because a thinner shell requires less heat and less reheating of the pattern. The danger of breakage increases slightly with a thinner shell. Acceptable small castings have been made from shells with an average thickness of about 0.100-in. The results from other shells of this thickness have not been uniformly successful and perhaps 3/16-in. is the most suitable average thickness for "squeezer" sized castings. Heavier castings require thicker shells.

Preliminary study indicates that for a pattern temperature of 350 to 450°F a contact time of six seconds will produce a ⅛-in. shell. For a "normal" 3/16-in. thick shell with a pattern temperature of 450°F, about 20 seconds contact time is required. No useful data are available at this time for temperatures from 550 to 1000°F. In the range from 300 to 550°F—the range best suited for production either with or without a shell making machine—the temperature may be ignored insofar as it being a

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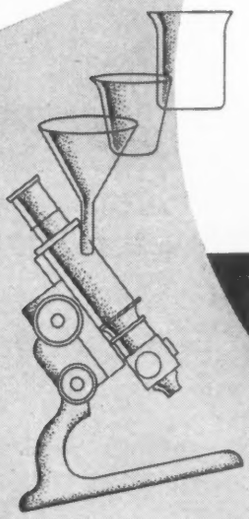

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variable in determining the thickness of the shell is concerned. However, other phases of formation of shells are a function of the temperature of the pattern, and to help control these the pattern temperature should be held constant at all times.

Although the actual thickness of a shell is not greatly dependent on the temperature of the pattern, the range of thickness that can be achieved at the different temperatures does vary with the temperature. That is, it seems impossible for a shell formed at 250°F to exceed about 1/16-in. thickness no matter how long the mix is permitted to remain in contact with the pattern; and to extend this, a pattern at 700°F can have eventually built up upon it a shell more than a full inch thick.

Pattern Heat Important

These thicknesses, of course, refer to amounts of mix adhering to the pattern from the action of heat alone. These combinations of thicknesses and temperatures are unlikely to occur anywhere but in the experimental laboratory, but the study of the action of the mix in extreme cases is important to an understanding of the process. If a thicker pattern were used rather than the small core plates employed for time-temperature studies, these figures would necessarily be revised. Rather than the temperature of the pattern, the heat capacity of the pattern is the important variable. However, the general principle holds true.

Apart from the above-mentioned importance of the pattern temperature there is another consideration. It has been observed that if a pattern is heated quite a bit above the heat of the pattern in neighboring cycles, the uncured mold may fall from the pattern at the time of the first inversion. Upon further study it was observed that each desired thickness (for a particular mix and pattern) seemed to have a maximum operating temperature above which this phenomenon was noted. It is difficult to give exact temperatures at which this occurs because the situation has only arisen during the production of the actual molds for pouring. When it was attempted to reproduce the conditions in a controlled situation, using small core plates for patterns, the shells did not fall from the pattern.

In a somewhat similar fashion a pattern which is too cool will also cause shells to fall from the pattern. While in the first case the falling was evidently caused by the too sudden

hardening of the shell and consequent loss of cohesive qualities, the cause in the second case is probably that the heat of the pattern is too low to permit sufficient melting of the resin to cause the particles of sand to cling together. Excessive use of parting agent will permit unbaked shell to fall from the pattern. In addition, if the pattern temperature is too low the final shell will be flexible and easily distorted even though extensive baking time is used.

Another reason the heat of the pattern and the time of contact must be controlled and noted is in respect to the overall cycle. For the same reason that the contact time should be kept as short as possible—so that as little heat as possible will be lost from the pattern—so must the heat of the pattern be kept as high on the working range of temperature as is practicable. Several complete cycles can thus be effected with a single initial pattern heating. Electrical heating of patterns to maintain constant pattern temperature may be used in production shell making machines. Application of heat to shells from both sides during curing, i.e. from both pattern side and oven side, may be of benefit in preventing warping of the shells.

Curing the Shells—When the heated pattern or corebox has received the mix during the contact stage, the exact shape of the finished shell or core has been determined and it is no longer possible to alter the face surfaces. Minor corrections, additions of mix or slight alterations with a slick or other instrument may be attempted without danger to the shell at this time. However, the resin is still in a semi-liquid form and the mold is very pliable. Further curing is necessary to complete the process. Two general methods are available, but only one of these can be used in high-speed production.

If the shell is permitted to stand in the open air over a period of hours, the resin will completely harden and the shell will be ready for use. This method will cause the mold to be cured quite evenly, although such a procedure is uneconomical in production. Drying racks could no doubt be arranged, but the shell at this time is rather weak and handling it will easily cause distortion or tears. The only time when air drying might be used is under job-shop conditions and then only if (1) it proves difficult to separate the pattern from the shell and (2) a dryer is available to assure a retention of form.

After the shell is formed, additional heat must be applied. While still

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WRITE FOR BULLETIN NO. 52

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on the pattern or in the corebox the shell is placed in or under an oven to complete the cycle. The length of time of this stage and the temperature of the heat source are easily controlled variables, but for best results should be fixed with relation to each other by the thickness of the pattern and the mix being made. For instance, for a shell ⅛-in. thick formed from 155 mesh sand with 6 per cent resin, two minutes at 350°F or one minute at 450°F will give a completely finished shell. During this time some of the baking will be done from the heated pattern.

Tests were conducted to study the strength of shells when the baking time and other factors in determining strength were kept at a constant value. A steel plate 8 x 1 x ¼-in. was heated to 300°F and permitted to remain in contact with a fixed quantity of sand-resin mix for 12 seconds. The small molds made by this method were baked for different periods of time and broken by being placed in a fixture, slowly adding weight to a knife edge until the breaking point was reached and then noting the total force applied.

Undercuring Serious Offense

At this temperature strength increased considerably until a baking time of about a minute-and-a-half was reached. After this time the strength leveled off and was almost constant at a time of six minutes. Thereupon the strength gradually decreased, but after ten minutes was still stronger than after one minute. It seems, then, that undercuring is a much more serious offense than overcuring. Further, an overbaked shell or core is more easily cleaned from the finished casting than is an under or even correctly baked shell, for the heat emitted from the casting may be considered an additional baking which burns out the shell or core, making cleaning easier.

Because the various shapes of the patterns also influence the determination of the proper baking time, it is difficult to formulate rules. However, it is possible to gage from the color of a shell with considerable accuracy the strength of the mold at any time during its baking period. Here, again, the color of the shell at the time when its strength is the highest depends on the type of resin and sand being used. In general, mixes whose initial color is tan attain their greatest strength when a dark brown shade is achieved, and white mixes are their strongest when the yellow shade begins to become

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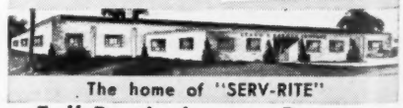

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spotted with a light brown or becomes uniformly light brown.

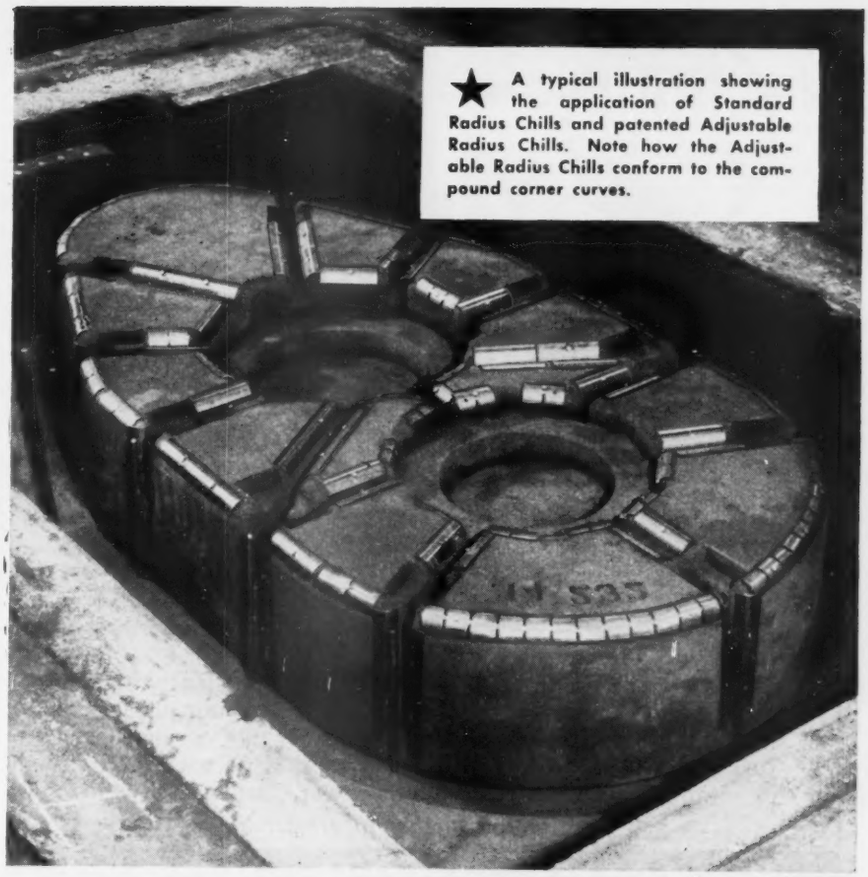
Stripping or Ejecting Shells—When the thermodie and shell are removed from the source of heat after the curing, a method of separating the shell from the pattern is required. The materials used must not endanger the pattern or the shell and the removal must take place swiftly.

One successful way involves the use of "push-off" or "ejector" pins installed in the pattern plate. These pins are placed strategically about the thermodie and around the pattern of the casting, especially at hollow or concave surfaces. The pins have larger diameter heads than bodies and are countersunk into the surface of the pattern. They should extend a uniform distance beyond the pattern plate and be provided with springs or a positive construction used so that there is no danger of moving when the pattern is inverted. Means should be arranged for a plate (ejector plate) which, when pressed against the bottom of the pins, will provide an even pressure against the shell to push it away from the pattern. Pins may be fastened to the ejector plates. After this "push" takes place, the completed shell can be removed by hand, or mechanically.

The method described is quite successful for shells; for cores an entirely different problem is presented. The construction of the corebox for shell molded cores must include a device for removal. Because a clamp is required to keep the corebox in place during the forming process, and the clamp may be a part of the corebox, it is usually possible to design the clamps so that their release will provide a wedge which will open the box. The usual situation at this point is that the two halves of the corebox are open and the core remains firmly in one or the other. Sometimes the core can now be removed with ease, but more often than not the core has to be forced out. Small pins should be installed in both parts of the box to aid in removal and to forestall breakage.

In the job shop type of production it is possible to strip a shell from the pattern by hand. In such cases the shells or cores may be purposely underbaked, the surfaces gradually separated by a thin blade and the resulting shell permitted to harden on a surface similar to the pattern, or the pattern, itself, may, of course, be used if it is flat. Any projections will cause binding due to shell shrinkage on cooling.

Assembling and Pouring — After two shells have been made and the



★ A typical illustration showing the application of Standard Radius Chills and patented Adjustable Radius Chills. Note how the Adjustable Radius Chills conform to the compound corner curves.

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required number of cores, if any, have been constructed, they may be stored or assembled into molds and poured immediately.

In assembling the mold the cores are inserted in the usual way and the two shells of the mold properly aligned. Clamps or nuts and bolts are usually employed to keep the shells in position. Pasting of shells is being experimented with. The openings are taped shut or they are covered with templates to keep the mold clean. The prepared assemblies may also be stored in this condition.

The prepared assemblies are next placed in flasks. In production set-ups a number of assemblies may be set in one flask which has channels in the sides for receiving them. Next, a quantity of metal shot or grit (or gravel or sand) is poured around the mold assemblies while the flasks with molds are vibrated to assure optimum packing of the backing material.

Poured in Conventional Fashion

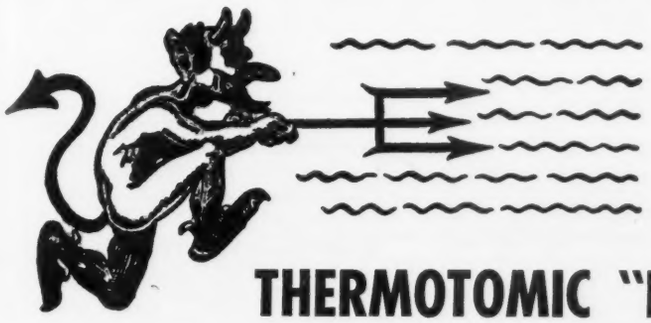
The tape or metal templates used to cover the mold pouring basins are next removed and the molds poured off in conventional fashion. Hand ladles or monorail suspended, small pouring ladles are used. Because of the better flowability of metal in baked shells, a rather low pouring temperature is permissible and generally preferred because of the better surface characteristics typical of iron poured at lower temperatures.

Since the baked shells are very permeable and since no moisture has to be evaporated, there is little tendency for gray iron to chill, and the possibility of gas inclusions due to the mold is lessened. When the cool castings are shaken out it will be noted that a great deal of resin has burned away, leaving the original sand.

In general, the cleaning of shell molded castings is relatively inexpensive due to the inherently fine finish obtained. No burning-in of sand occurs. After shakeout, castings may be shot blasted with finest commercial shot available such as SAE Shot No. 170 which has an average size of about 80 mesh or 0.017-in. diameter. One of the newer continuous type airless blast installations would seem well suited for a new production installation. The usual grinding of gates has to be done although the amount of grinding is greatly diminished due to the use of smaller gates and risers. Overall cleaning time and cost is greatly reduced as compared to conventional green sand castings.

(To be concluded next month)

New Head Compound Saves Metal!



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Exothermic Carbon Free Liquidizer For Iron, Steel, Nodular Iron

Produces more castings per heat through savings of feeding metal in risers or feeding heads which can now be reduced in height 40 to 70% of their diameter.

SOFFEL'S THERMOTOMIC HOTOP CARBON FREE LIQUIDIZER is different from other head compounds in that HOTOP LIQUIDIZER does NOT contain powdered metal, is NOT a thermit compound. It is a patented exothermic compound entirely free of carbon, sulfur and phosphorous and can be used without danger of contamination on any ferrous metal or alloy.

HOTOP LIQUIDIZER also saves molding time as less sand is needed in the mold cope due to short height of risers. HOTOP LIQUIDIZER produces a liquid slag well over 4000° F. of heat and insulates the metal. The feeding metal will remain liquid at least 50% longer assuring adequate feeding while the casting cools and solidifies. Piping and shrink cavities caused by premature freezing of the feeding metal are eliminated.

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SOFFEL'S EXOTHERMIC CARBON FREE LIQUIDIZER is the leader in major foundries for use on both ferrous and non-ferrous metals and also in ingot production. It is the original scientific non-carbon, exothermic compound for feeding heads and risers.

When applied on the heads or risers CARBON FREE LIQUIDIZER reacts within itself exothermically, producing a temperature above 3200° F. It actually increases the temperature of the feeding metal to a point well above that of the metal in the main body of the casting, thus ensuring that the feeding metal will be the last to freeze. In this manner, shrink cavities in the casting caused by premature freezing of the feeding metal will be eliminated. After the exothermic action has ceased, the LIQUIDIZER forms a soft refractory insulating blanket on the metal. This confines the heat generated by the LIQUIDIZER and aids in maintaining the desired high temperature of the feeding metal in the heads or risers.

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THERMOTOMIC COMPOUND is a patented Exothermic compound that can be molded into any desired shapes and used as feeding ring inserts under risers or as facing application where it is desired to maintain fluidity of the casting metal. THERMOTOMIC permits reversal of the trend towards large feeding heads and risers, making it possible to use heads that are shorter and more compact with 1½" feeder openings. This permits easy removal of heads and gates and sharp reductions in cleaning and finishing costs. When THERMOTOMIC is used as inserts or as facing mixed with molding sand in the mold, heat at thin metal sections is retained until the main body of the casting has solidified, thus eliminating shrink cracks and improving grain structure and tensile strength. For use in green sand molds, use THERMOTOMIC W. P. (Waterproofed)

NOTE: SOFFEL'S CARBON FREE LIQUIDIZER NO. 5 is recommended for use on top of feeding heads in conjunction with THERMOTOMIC COMPOUND. For aluminum castings, use THERMOTOMIC ABC and AL-X31 LIQUIDIZER. When ordering a trial sample, advise the kind of metal to be used on.

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...TRADE PUBLICATIONS...

For More Details on these Items Use Reply Card—Page 259

INDUCTION FURNACES: Russ Electric Furnace Co., 1775 Broadway, New York 19—Bulletin describes applications of low-frequency induction furnaces for melting ferrous and nonferrous metals. Units range from 700 to 5500 lb capacity for melting copper-base alloys, 1100 to 6600 for aluminum, and 700 to 900 for iron. Another bulletin also describes other types of the company's electric furnaces, including heat treating units.

For More Details Circle No. 120—Page 259

AIR COMPRESSORS: Worthington Corp., Harrison, N. J.—Bulletin H-630-B1 describes two-stage, air-cooled radial air compressors capable of producing 80 to 125 pounds of pressure. The 12-page bulletin gives dimensions and weights of bare, base-mounted multi-V-belt driven, base-mounted flexible-coupled and close-coupled compressors. Capacities, sizes, general specifications and cross section photographs are included. A request on company letterhead will bring a copy of this bulletin.

For More Details Circle No. 121—Page 259

HYDRAULIC CYLINDERS: Air & Hydraulic Division, Lindberg Engineering Co., 2443 W. Hubbard St., Chicago 12—The 28 pages of bulletin 701 describe the complete line of hydraulic cylinders manufactured by the company. Diagrams, photographs and charts explain the different mounting types and capacities of hydraulic cylinders up to 1500 and 3000 psi working pressure.

For More Details Circle No. 122—Page 259

EQUIPMENT: Ingersoll-Rand, 11 Broadway, New York 4—A 36-page booklet presents a brief history of the company, its plants and its products. Nearly 100 pictures show the firm's products at work. These products include rock drills, air and electric tools and hoists, air and gas compressors, gas and diesel engines, centrifugal blowers, centrifugal and propeller pumps, vacuum and condensing equipment and refrigerating units.

For More Details Circle No. 123—Page 259

CRANE CAB COOLERS: Dravo Corp., Dravo Bldg., Fifth & Liberty Aves., Pittsburgh 22—Designed to maintain comfortable working conditions and to supply clean air under virtually all atmospheric and temperature variations, a complete line of crane cab coolers and conditioners is described in illustrated bulletin 1301. Functions of the equipment include dust and dirt removal, fume and odor removal, winter heating and summer cooling. Included in the bulletin are complete specifications for the various models and suggestions on where and how to use them.

For More Details Circle No. 124—Page 259

DUST FILTER: W. W. Sly Mfg. Co., 4700 Train Ave., Cleveland—Bulletin 102 describes new dust filter designed primarily for continuous process industries where uniform suction at all dust points is essential. Complete engineering data includes details of construction, principle and application. The bulletin also contains hints on the engineering of dust control problems and similar subjects.

For More Details Circle No. 125—Page 259

INDUSTRIAL INSULATION: Baldwin-Hill Co., 1021 Breunig Ave., Trenton, N. J.—Illustrated 20-page catalog describes insulating materials which cover temperature range from minus 150°F to 1800°F. It contains thermal-conductivity graphs, heat loss charts, brief applications and other information. Products discussed include insulating cement, block, blanket, felt, and pipe covering and others.

For More Details Circle No. 126—Page 259

WELDING ELECTRODES: General Electric Co., Schenectady 5, N. Y.—A 49-page booklet describes the application, chemical analysis and mechanical properties of the company's welding electrodes. It also includes an electrode trouble-shooting chart which specifies the number of electrodes per pound and an explanation of the significance of AWS nomenclature. Same company has developed a welding electrode com-

"Looks like all your practice on a pogo stick is coming in handy now, Ed!"

parator slide rule which permits comparison of its product with those of other electrode manufacturers.

For More Details Circle No. 127—Page 259

CUT-OFF SAW BANDS: DoAll Co., 254 N. Laurel Ave., Des Plaines, Ill.—Bulletin 51-803 deals with cut-off saw bands for production sawing all kinds of material. Technical data given includes specifications as to available types of cut-off bands, lubricating information for cutting different kinds of material, use of different tooth "sets" for different cutting jobs and data on several specific cutting operations.

For More Details Circle No. 128—Page 259

CONSULTING ENGINEERS: Sam Tour & Co. Inc., 44 Trinity Place, New York 6—Brochure entitled "All Under One Roof" explains the variety of technical services the firm offers to industry. These include research projects on new materials, development of products, processes and production methods, technical consultation, legal testimony based on investigations and nondestructive testing in the laboratory and the field.

For More Details Circle No. 129—Page 259

DUST CONTROL: Claude B. Schneible Co., P. O. Box 81, North End Station, Detroit 2—Bulletin entitled "The Invisible Shield" contains excerpts from the company's new motion picture of the same title. It describes operating principles of the company's principal products, including the cupola collector, pouring hood, smoke-off hood, shakeout hoods, velocitrap and Multi-Wash dust collector.

For More Details Circle No. 130—Page 259

HEAT ENCLOSURE: M. H. Detrick Co., 111 West Washington St., Chicago—Booklet shows how the knowledge gained from nearly a half-century of experience is applied to specific heat enclosure problems in various industries and describes a variety of modern heat enclosure constructions which may be applied to present day units. Copies are available upon request on business letterhead.

For More Details Circle No. 131—Page 259

ELECTROLYZERS: General Industrial Development Corp., 270 Park Ave., New York 17—Operation of Bamag-Meguin pressure bipolar type electrolytic cells for the manufacture of pure hydrogen and oxygen are discussed in detail in an 8-page bulletin which includes several illustrations, a layout of a typical installation, a schematic drawing, performance curves and complete technical data.

For More Details Circle No. 132—Page 259

WEAR-RESISTANT STEEL: Stulz-Sickles Co., 134 Lafayette St., Newark, N. J.—Volume 2, No. 12 issue of "Manganal Marketer" deals with foundry applications of the company's manganese-nickel wear-resist-

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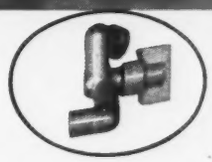

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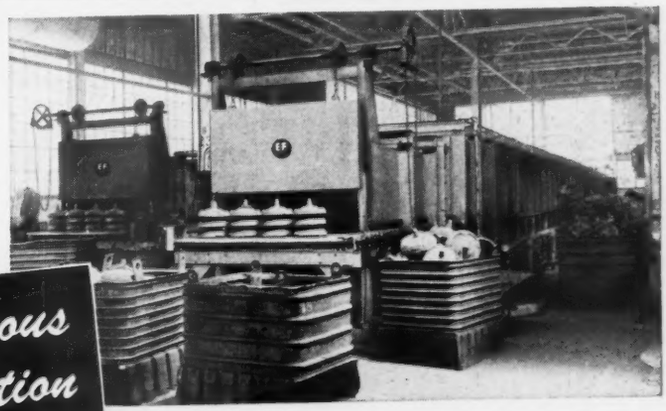

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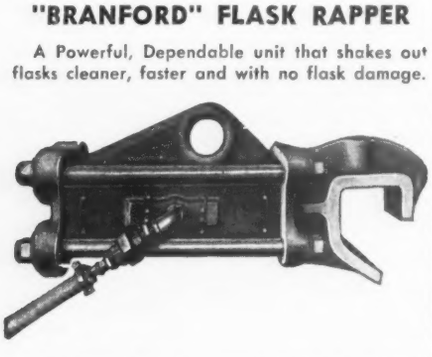

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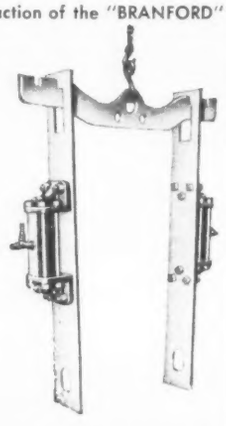

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ant steel bars and plates. Applications described include shakeout decks, shot-blast cabinets, shot-blast hooks and racks, end and deflector plates in barrel-type shot-blast machines. Various sizes of bars and plates available are listed

For More Details Circle No. 133—Page 259

TROLLEY POWER SYSTEM: Feedrail Corp., 125 Barclay St., New York 7—Catalog 30 announces the addition of heavy-duty trolley power distribution systems rated at 250, 375 or 500 amp, 250 v dc, 575 v ac, single or three phase, to the firm's line. It provides detailed, illustrated information about those systems in its 16 pages. Bulletin 27 concerns same equipment.

For More Details Circle No. 134—Page 259

GRINDERS AND BUFFERS: Hisey-Wolf Machine Co., Division of Cincinnati Electric Tool Co., Madison & Edwards, Cincinnati—Catalog 72 lists, with photographs and specifications, such products as buffing and polishing machines, combination grinders and buffers, dust collectors, dust hoods, eye shields, grinding machines and attachments and accessories.

For More Details Circle No. 135—Page 259

SAFETY: Boyer-Campbell Co., 6540 St. Antoine St., Detroit 2—"Everything for Safety" is the title of a 44-page catalog which describes face shields, welding helmets, liquids and creams for protection against skin infections, safety clothing, machine guards and other equipment required for a comprehensive safety program. Request a free copy on letterhead.

For More Details Circle No. 136—Page 259

SPEED REDUCERS: Dodge Mfg. Corp., Mishawaka, Ind.—Bulletin A-614-A presents engineering information and selection data on the company's speed reducers and its new overload release, which is designed for use with the reducer. Data and tables have been revised to cover the new unit, which increases maximum capacity from 37 to 43 hp.

For More Details Circle No. 137—Page 259

DERMATITIS CONTROL: West Disinfecting Co., 42-16 West St., Long Island City 1, N. Y.—Booklet of 32 pages presents a simple, inexpensive dermatitis prevention and control program designed to guarantee personal cleanliness, protect exposed skin areas, prevent clothing contamination and guard against special hazards.

For More Details Circle No. 138—Page 259

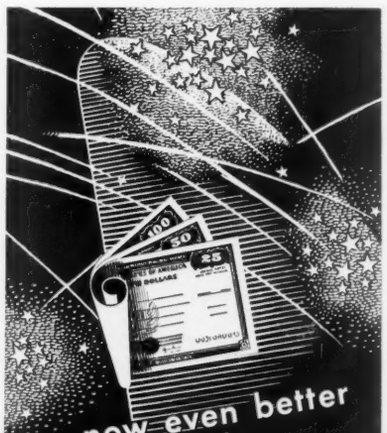
ALLOY CASTINGS: International Nickel Co. Inc., Dept. EZ, New York 5—"Heat Resistant and Corrosion Resistant Alloy Castings in Industry" is a 48-page booklet which discusses typical compositions, their applications and limitations. Over 175 photographs illustrate applications of typical alloys by industry. Charts compare creep strength of various alloys and resistance to corrosion and oxidation. Tables of composition list principal Alloy Casting Institute designations as well as certain proprietary alloys.

For More Details Circle No. 139—Page 259

METAL WASHERS: Despatch Oven Co., 619 S. E. Eighth St., S. E., Minneapolis—Bulletin 68 illustrates and describes typical company washers from single-stage units for simple wash jobs to multiple stage machines for preparing metal to receive a very fine finish. Two pages are devoted to the firm's finishing systems

For More Details Circle No. 140—Page 259

MAGNESIUM FINISHING: Magnesium Dept., Dow Chemical Co., Midland, Mich—Company has revised its manual on finishing systems for magnesium products. The 128-page revision describes surface stability and surface treatment, including cleaning, mechanical finishing, chemical treatments, electroplating and painting. It also covers assembly protection for magnesium alloy die castings, sand and permanent mold castings and sheet, plate and extrusions.



For More Details Circle No. 141—Page 259

REVOLVING CARRIAGE: Towmotor Corp., 1226 East 152nd St., Cleveland 10—Data sheet describes revolving carriage standard accessory of the company's fork lift trucks which rotates heavy loads of solid, granular or liquid materials 360 degrees in either direction. It can empty a container mounted on the forks in approximately 5 seconds.

For More Details Circle No. 142—Page 259

SAND CONDITIONING: National Engineering Co., 549 W. Washington Blvd., Chicago 6—New sand conditioning unit is described and illustrated in Bulletin 508, which contains descriptive data on the unit's six component parts, operating and maintenance data, and photographs

and drawings showing how these units are installed. A cost estimate table enables foundries to compare cost of the new unit with that of their present methods of sand handling and conditioning.

For More Details Circle No. 143—Page 259

COPPER ALLOYS: R. Lavin & Sons Inc., 3426 Kedzie Ave., Chicago 23—Recent issue of the company's periodical, *The Lavinget*, discusses the rates of removal of common impurities from secondary copper alloys by means of air injection, and an investigation of the effect of commercial oxygen on these rates of removal.

For More Details Circle No. 144—Page 259

CONVEYORS: A. B. Farquhar Co., Division of Oliver Corp., York, Pa.—Booklet presents illustrated case histories of the uses of the company's conveyor products as made by its customers. There are sections pertaining to package handling, bulk handling, coal handling and special conveyors.

For More Details Circle No. 145—Page 259

DUST COLLECTORS: American Wheelabrator & Equipment Corp., 505 South Byrkit St., Mishawaka, Ind.—New periodical, *Dust and Fume Topics*, is devoted to news of how the company's cloth, tube type dust collectors handle various industrial dust and fume control problems. All items are illustrated.

For More Details Circle No. 146—Page 259

MELTING FUEL ECONOMY: Whiting Corp., Harvey, Ill.—Fifth of a current series of information folders released by the corporation, a 6-page report called "Here's How to Save Melting Fuel" tells where to watch for heat losses on the way from melting furnaces to molds and what to do about such losses.

For More Details Circle No. 147—Page 259

MOLECULAR BONDING: Al-Fin Division, Fairchild Engine and Airplane Corp., Farmingdale, L. I., N. Y.—Brochure describes process of molecularly bonding aluminum and ferrous metals, applications of the process and basic design information. The brochure contains more than 50 photos of applications.

For More Details Circle No. 148—Page 259

TUNNEL BURNERS: Hauck Mfg. Co., 124-136 Tenth St., Brooklyn 15, N. Y.—Catalog 807 describes tunnel burner assemblies used in heat processing. Twenty sizes are listed for natural and artificial gas. Photographs, diagrams and specifications are included.

For More Details Circle No. 149—Page 259

FOUNDRY PRODUCTS: Lebanon Steel Foundry, Lebanon, Pa.—A 36-page illustrated booklet deals with the products and procedures of the company. It emphasizes the historic aspects of the Lebanon area and the workmanship of local craftsmen.

For More Details Circle No. 150—Page 259

A Chronology of ... **RADIUM RADIOGRAPHY**

1930— First commercial use of gamma rays; radiograph made of sternpost of cruiser "Chester".

1935— First purchase of radium for industrial radiography by Westinghouse; bought from Radium Chemical Co., Inc.

1938— AFA questionnaire revealed that 8% of steel casting men used radium radiography.

1941— 22% of steel casting men bought, rented, leased or employed radium for radiographic purposes.

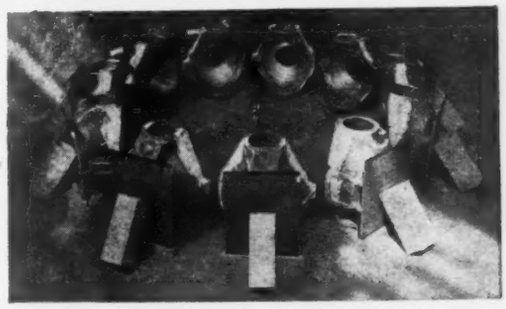
1946— 150 steel foundries rented or leased radium.

1947— American Society for Testing Materials issued Radiographic Standards for Steel Castings. (Gamma Ray). E71-47T.

1948— 200 steel foundries rented or leased radium.

1949— Revision of the U. S. Navy Universal Exposure Calculator for Radium Radiography by N. A. Kahn, E. A. Imbembo and J. Bland, New York Naval Shipyard, Brooklyn, N. Y.

1950— 250 steel foundries rented or leased radium.



Large number of castings being radiographed simultaneously

Radium radiography has improved production of steel castings and effected economies. The apparatus is simple, requires no special training to operate, is portable, and most important, involves no capital expenditure. The apparatus may be bought, leased or rented. Investigate our claims, and write today for additional information.

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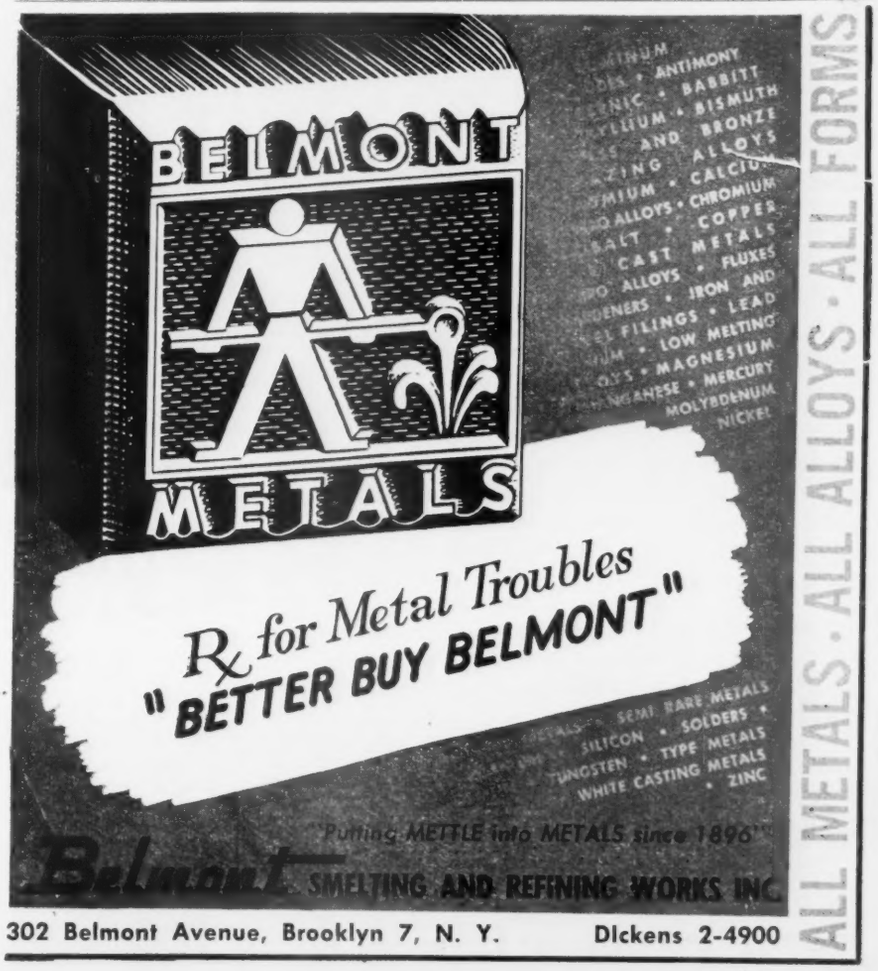
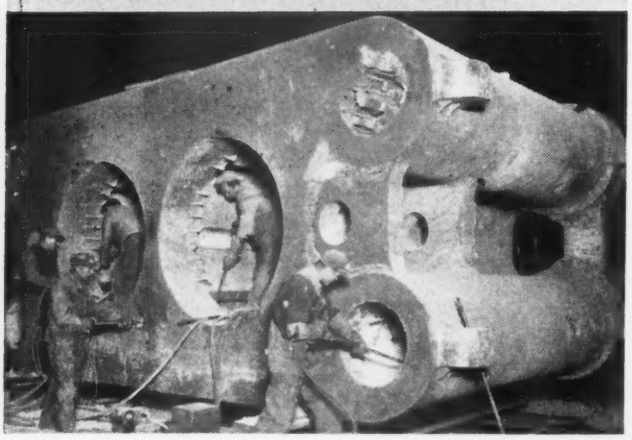


COMPOUND "M" Speeds Core Knock-out and Cleaning of Castings



By rapid penetration of core sand, Compound "M" quickly disintegrates stubborn lumps and saves you time and money on core knock-out and cleaning of castings.

Foundrymen report, the easier, better working conditions promoted by the use of Compound "M" in these operations, have provided remarkable savings thru greater foundry efficiency. Installation is simple and inexpensive. Why not investigate the many advantages of this method today.

Just call or write and a Johnson-March engineer will be glad to discuss and assist you in your problems at no obligation.

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EQUIPMENT LASTS LONGER
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SCRUBS, CLEANS AND DRIES
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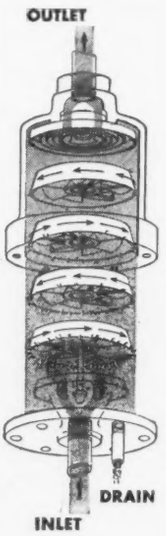

LASTS LONGER because...
The Aridifier's patented centrifugal-baffle action traps 92% of all dirt, oil, scale and water in gas or compressed air . . . and drains off these troublemakers *before* they can damage tools and equipment.

PERFORMS BETTER because...
The Aridifier protects tools against the freezing, fouling, caking and corrosion caused by dirt and foreign matter . . . assures the clean, dry air and gas that means better spray work, painting, lacquering, sand blasting, air cleaning, and similar operations.

Easily installed, the Aridifier maintains itself. 10 models. Capacity range; 7 CFM to 17,000 CFM.

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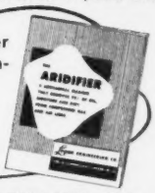

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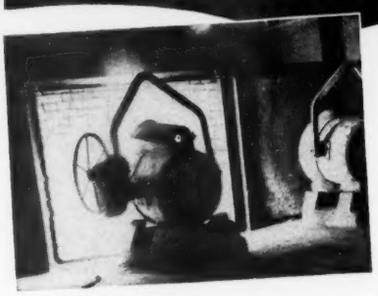

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MAXIMUM SPEED AND ECONOMY

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1. The wall confines the heat to the inside of the ladle.
2. Produces higher and more uniform ladle temperatures.
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5. Burners are controlled from behind the wall.

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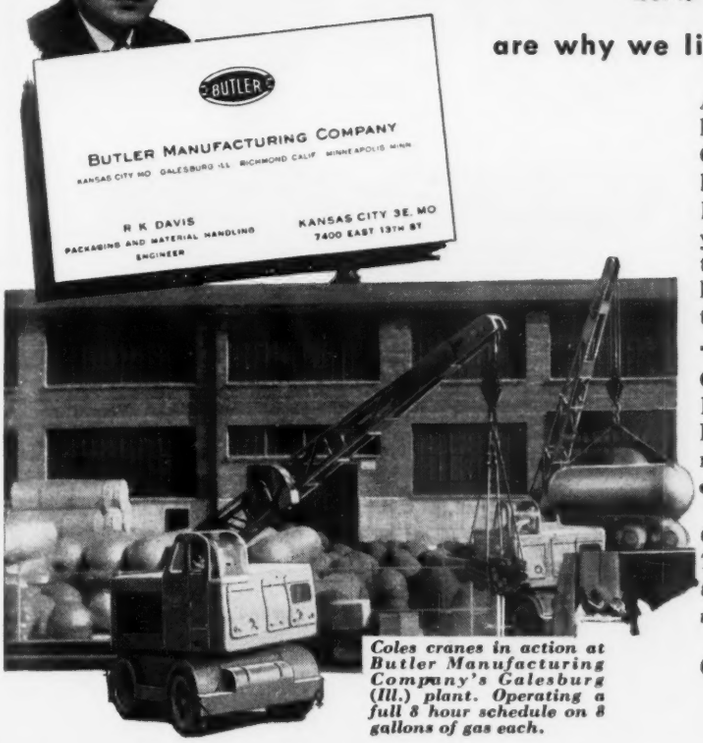
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Compare these features: Safe-load Indicator, Finger-tip controls, Full 360° Swing, Reversible Steering, Cantilever Boom—and many more unique "EXTRAS." Over 70 years of engineering leadership make a difference!

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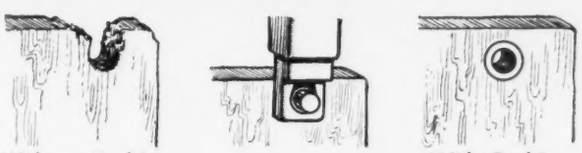
FOR WOOD PATTERN BOARDS



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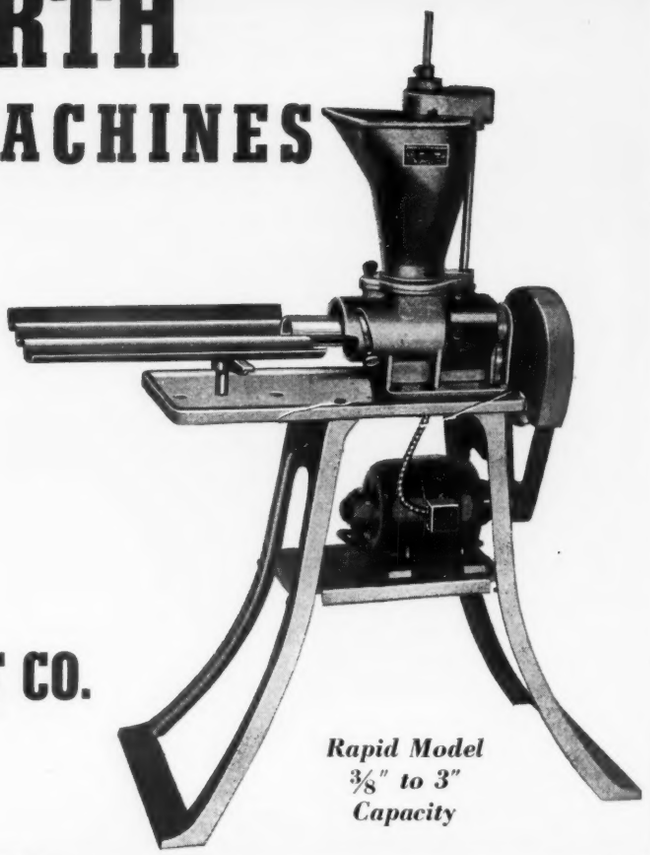

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3/8" to 3"
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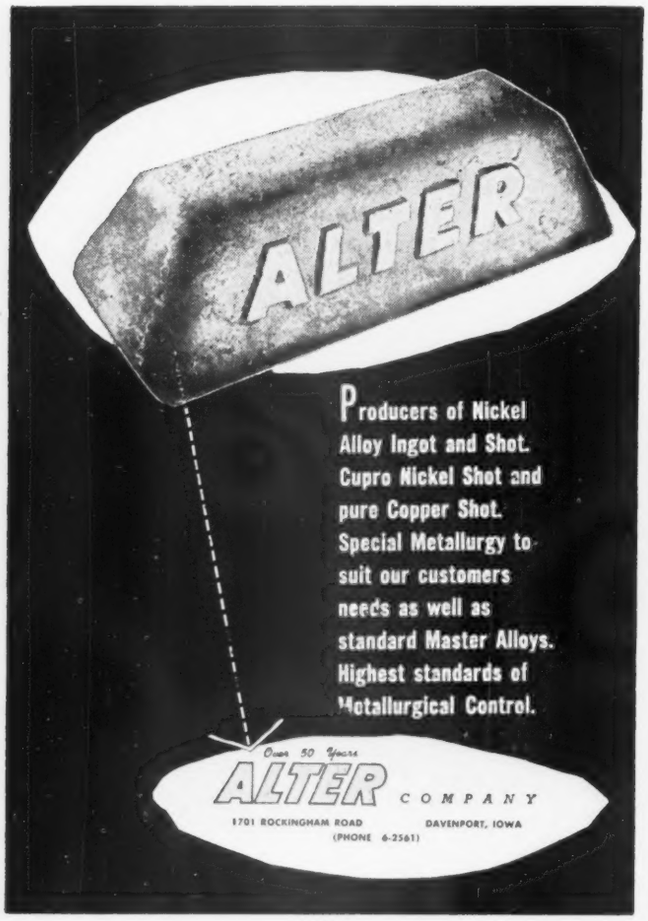

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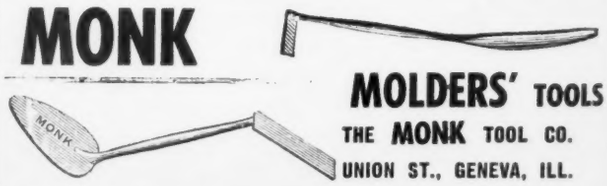

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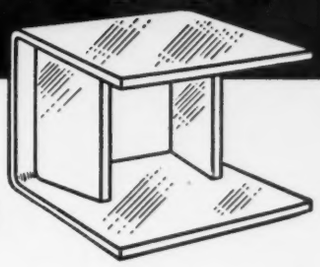

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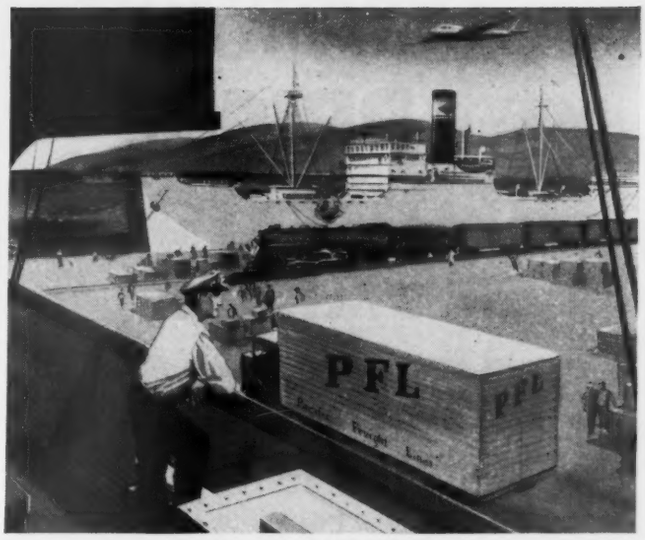

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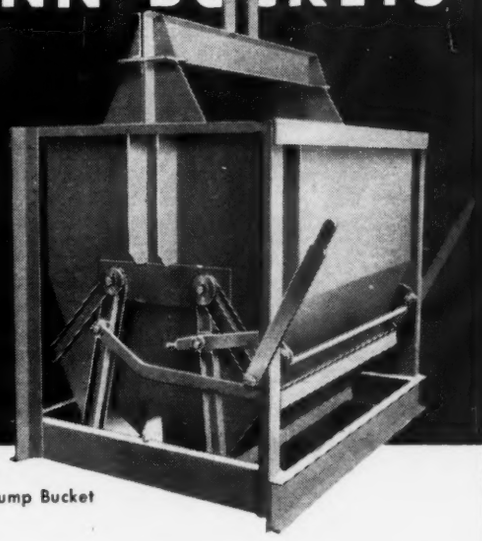

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Bottom Dump Bucket

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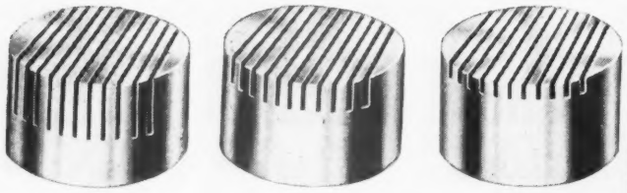

X-TRA DEEP HEAD	DEEP HEAD	SHALLOW HEAD
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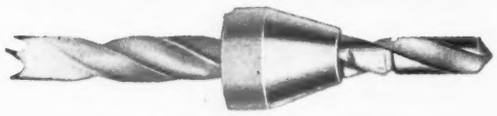

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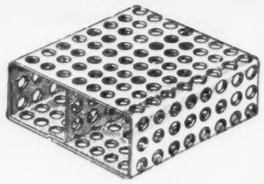

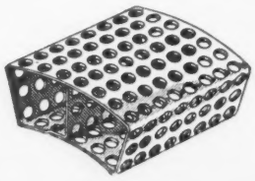

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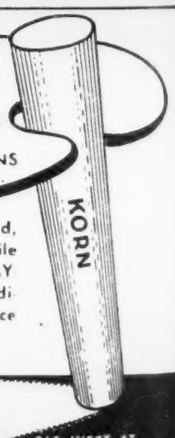

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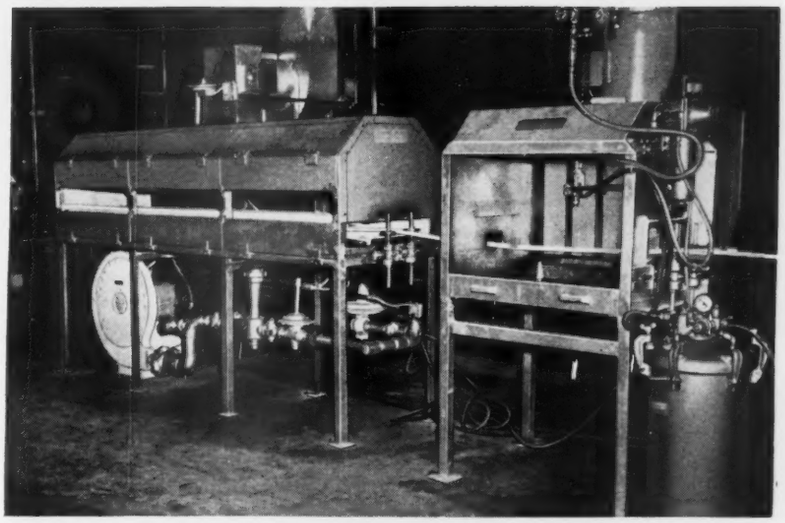

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Your chain problems are substantially reduced with TM Alloy Steel Chain. Records prove it *outlasts* and *outperforms* wrought iron types. It's more economical too!

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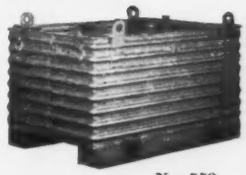

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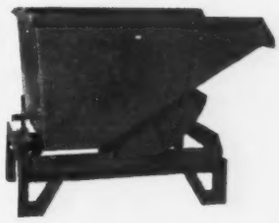

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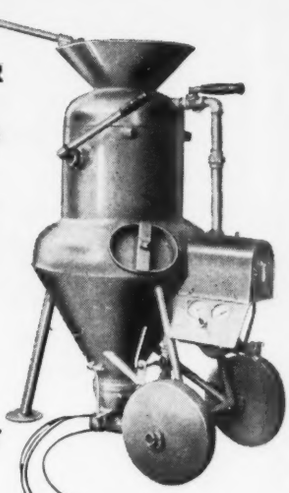

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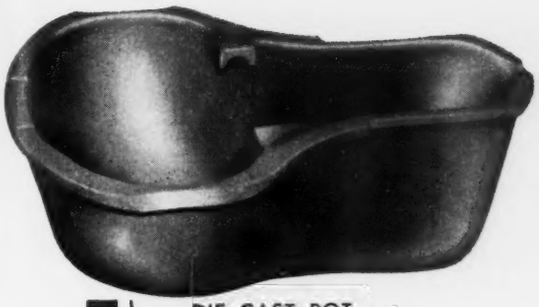

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for producing BETTER BRASS *and* ALUMINUM-CASTINGS

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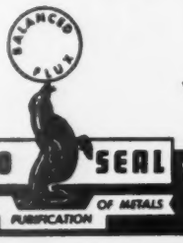

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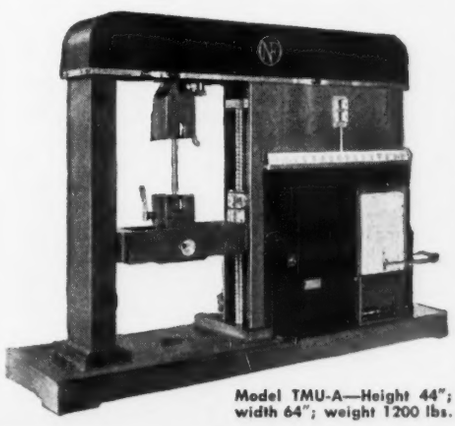

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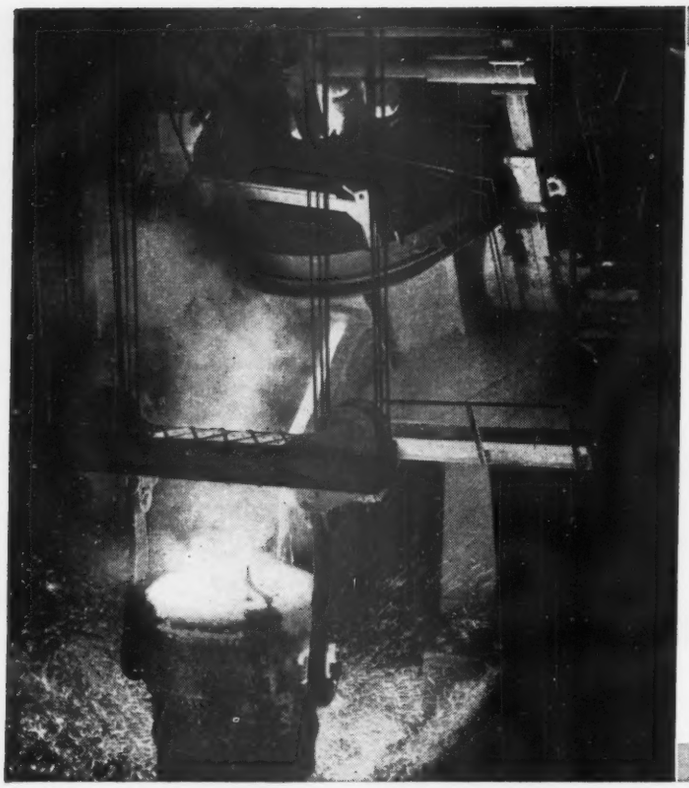

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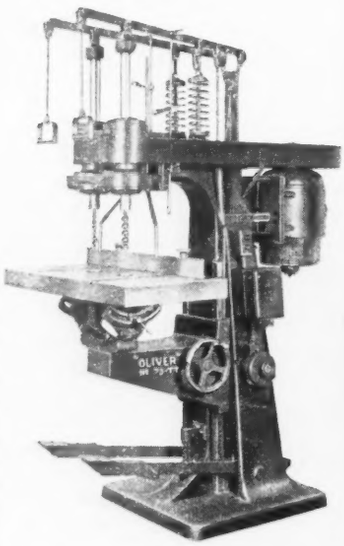
For large patterns . . . bores holes up to 3" diameter, 12" deep, to the center of 36"



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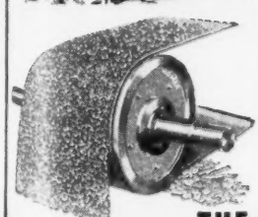
. . . CAN BE USED INSIDE or OUTSIDE PLANT . . .



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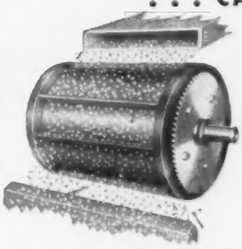

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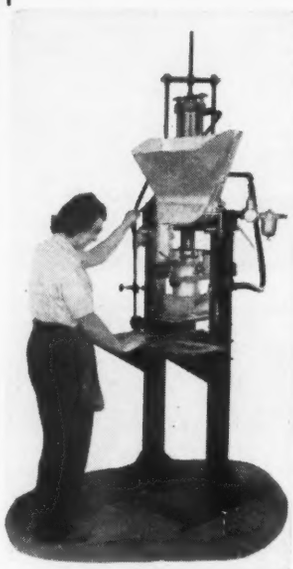

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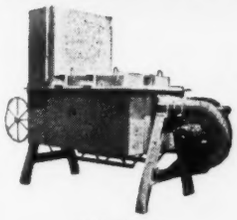
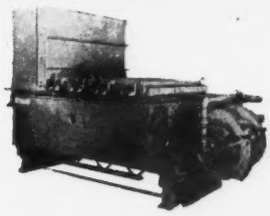


400 Series



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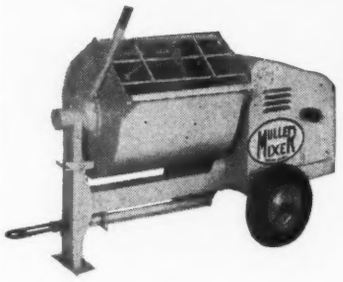

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DAYTON, OHIO

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Statement of the ownership, management, and circulation required by the Act of Congress of August 24, 1912, as amended by the Acts of March 3, 1933, and July 2, 1946 (Title 39, United States Code, Section 233) of FOUNDRY, published monthly, at Cleveland, Ohio, for October 1, 1952. 1. The names and addresses of the publisher, editor, managing editor, and business managers are: Publisher, The Penton Publishing Co., 1213 West Third St., Cleveland, O. Editor, Frank G. Steinebach, 1213 West Third St., Cleveland, O. Managing editor, William G. Gude, 1213 West Third St., Cleveland, O. Business manager, George A. Pope, 1213 West Third St., Cleveland, O. 2. The owner is The Penton Publishing Co., 1213 West Third St., Cleveland, O. Names and addresses of stockholders owning or holding 1 percent or more of total amount of stock: Edwin C. Barringer, Washington, D. C.; Samuel E. Bool, Cleveland, Ohio; County National Bank and Trust Co. of Santa Barbara, Santa Barbara, Calif.; J. R. Dawley, Cleveland, Ohio; Mrs. Frances Penton Force, Lansing, Mich.; Mrs. Agnes T. Hays, Cleveland, Ohio; George O. Hays, Cleveland, Ohio; R. C. Jaenke, Cleveland, Ohio; S. H. Jasper & Leona F. Jasper, Pittsburgh, Pa.; A. L. Klingeman, Cleveland, Ohio; J. D. Pease, Mount Dora, Florida; Francis O. Rice, Cleveland, Ohio; E. L. Shaner, Cleveland, Ohio; C. J. Stark, Cleveland, Ohio; Penelope M. Stark, Cleveland, Ohio; The Wean Engineering Co., Inc., Warren, Ohio; Edith L. Werner, Cleveland, Ohio; Grace Whelan, Santa Barbara, Calif. 3. The known bondholders, mortgagees, and other security holders owning or holding 1 per cent or more of total amount of bonds, mortgages, or other securities are New England Mutual Life Insurance Co., 501 Boylston Street, Boston 17, Mass. 4. Paragraphs 2 and 3 include, in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting; also the statements in the two paragraphs show the affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner. Frank G. Steinebach. Sworn to and subscribed before me this 26th day of September, 1952. (Seal) Joseph P. Lipka. (My commission expires Sept. 9, 1955.)

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13 HELPFUL CHAPTERS ON ALL PHASES OF THE CUPOLA. "How To Use The Cupola" . . . . 13 idea-packed chapters based on the practical experience of a man who has devoted his life to foundry fuel and melting problems. It's a mighty useful handbook—a handy source of information which will pay for itself many times over in the months and years ahead.

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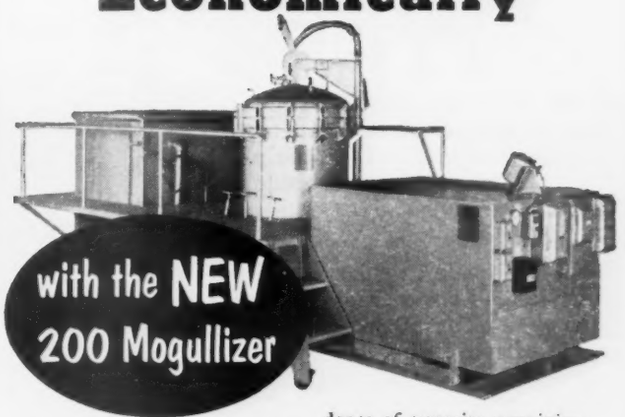
Impregnate PRESSURE CASTINGS Economically



A positive, low-cost method of impregnating pressure castings to meet the most rigid specifications. Pressure castings impregnated with this equipment have been successfully subjected to severe tests with hot kerosene, hot oil, hot water and other solutions under pressure, with no evidence of porosity remaining.

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If your contract calls for casting impregnation, get the facts on this MOGULLIZER packaged plant which utilizes both pressure and vacuum stages.

Write today for free literature and recommendations for your casting salvage problems.

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Write for pamphlets giving detailed information. Both materials carried in stock by America's foremost foundry jobbers

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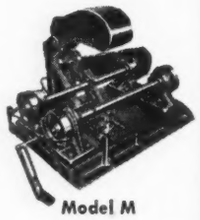
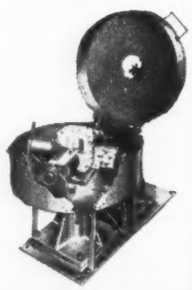
CENTRIFUGAL CASTING MACHINES

Model AS

Model J


Model M


Model J-P

These machines used to make ferrous and non-ferrous centrifugal castings are produced by the pioneer manufacturer of such equipment.

They are made in a large variety of styles and a wide range of sizes. Complete technical information is supplied concerning sand and permanent mold design, gating, sand mixes, speeds, etc.

Send us drawings or sketches of parts you are interested in casting centrifugally, and we will tell you, without obligation, if and how our machines can cast them faster, cleaner and with fewer rejects.

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Reduce Use of Chills in Gray Iron Casting

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13,000 Sq. Ft.—1 STORY POURED CONCRETE BUILDING

223' long x 51' wide, 25' to eaves—with 68' x 25' addition.

Immediate Possession

Reconstruction Finance Corporation invites bids for the purchase of Foundry Property formerly occupied by Bay Foundry, Escanaba, Michigan. Property is located at Wells, Michigan which is about 4 miles from Escanaba. Close to highway. 200′ R. R. siding, Escanaba and Lake Superior Railroad spur track. 4.19 acres of land with 300′ frontage on Delta County highway #285, 700′ frontage on Little Bay DeNoc, Lake Michigan, and 150′ frontage on Town of Wells highway.

Cupola, hoists, charger, ladles, squeezers, Mulbarrow, tumbling barrel, core oven, Ingersoll Rand Compressor with 50H.P. Electric motor, hoists, motors, blowers and miscellaneous equipment.

Anyone interested in the purchase of this property may obtain bidding forms and a statement of terms and conditions relating thereto at the Minneapolis Agency of RFC, Room 210, 607 Marquette Avenue, Minneapolis 2, Minnesota.

Bids for the property will be considered only if made in accordance with and subject to the terms and conditions set forth in said statement. All bids must be presented at the aforesaid Minneapolis Agency of RFC, by 2:00 P. M., Central Standard Time, on December 20, 1952.

CLASSIFIED ADVERTISING

Help Wanted

FOUNDRY FOREMAN

Northeastern Ohio Iron Foundry needs experienced foreman in mechanized shop on squeezer machines. Write full information, strictly confidential, salary.

BOX 361

FOUNDRY **CLEVELAND 13, OHIO**

METALLURGICAL SALES ENGINEER

An excellent opportunity to associate with a leader in its field. Must be familiar with general foundry business and technique.

Required to know Chicago and/or Detroit areas. Submit resume to:

BOX 360

FOUNDRY **CLEVELAND 13, OHIO**

SHELL MOLDING SPECIALISTS

Midwestern steel and alloy foundry desires capable individual to supervise shell molding, both experimental and production. Experienced with college training preferred. Send resume of experience and salary expected. Address: Box 365, FOUNDRY, Cleveland 13, Ohio.

Help Wanted

FOUNDRY SUPERINTENDENT

Grey iron foundry capacity 15 tons daily, brass foundry 4,000 pounds daily. Produces jobbing castings, modern equipment. An aggressive man with an abundance of initiative and "know-how" can have a very exceptional opportunity! In the finest section of the country. Must know sand, cupola, ductile iron, latest foundry methods and products. Knowledge of silicon and aluminum bronze would be helpful. Write in detail previous experience and starting salary. Man over 45 preferred. Address: THE C. I. CAPPS COMPANY, INC., P. O. BOX 3335, JACKSONVILLE, FLORIDA.

PERMANENT MOLD ENGINEER

Expanding Illinois Aluminum foundry offers excellent opportunity for active participation in ownership to permanent mold designer with excellent qualifications and experience and a desire to build on a worthwhile enterprise.

BOX 190

FOUNDRY **CLEVELAND 13, OHIO**

FOUNDRY ENGINEER

Large nonferrous smelter and refiner. State training, experience and references in first letter. Address: Box 337, FOUNDRY, Cleveland 13, Ohio.

METALLURGIST

Recent graduate in Metallurgical or Mechanical Engineering for development work in nationally known Midwest nonferrous industry. One to two years experience desirable but not essential. State qualifications and salary expected in first letter. Address: Box 364, FOUNDRY, Cleveland 13, Ohio.

Help Wanted

FOUNDRY RESEARCH METALLURGIST

Mechanical or Metallurgical Engineering graduate with foundry experience. Desire man with mechanical aptitude, research ability, and experience. To work in development section in laboratories of nationally known Midwest nonferrous industry. State qualifications and salary expected in first letter. Address: Box 363, FOUNDRY, Cleveland 13, Ohio.

CORE ROOM FOREMAN

For jobbing and semi-production gray iron foundry making castings from ½ lb. to 15,000 lbs. in weight. Twelve core makers. Man will have complete charge of core room, floor core making, core blowers and jolt rollover machines. Well established company in small town in Southern Ohio. Prefer man not over 48 years of age. Must have experience on variety of cores both large and small. Address: Box 374, FOUNDRY, Cleveland 13, Ohio.

FOUNDRY SUPERINTENDENT OR FOREMAN

About 40 years of age, for gray iron foundry, Philadelphia area, capable of some field work and traveling. State experience, qualifications and references. Give full details. Address: Box 369, FOUNDRY, Cleveland 13, Ohio.

STEEL FOUNDRYMAN

Thoroughly experienced, to take charge of heading and gating of medium sized steel castings. Must maintain good quality castings with a high yield. Foundry in Ohio. Please write full details in confidence. State salary required. Address: Box 397, FOUNDRY, Cleveland, Ohio.

METALLURGIST INVESTMENT-STEEL CASTINGS

Opportunity for experienced man qualified to direct all phases of business. Address: Box 380, FOUNDRY, Cleveland 13, Ohio.

CLASSIFIED ADVERTISING

Help Wanted

MAINTENANCE SHOP FOREMAN
Man to take charge of overhauling, rebuilding all types of foundry equipment. Salary up to $7500 and profit participation for right man. Address: Box 382, FOUNDRY, Cleveland 13, Ohio.

METALLOGRAPHER
OR
JUNIOR METALLURGIST
Manufacturing Plant Metallurgical Department, experienced in metallographic studies of ferrous and nonferrous metals and alloys. Foundry experience desired, salary open. State qualifications, references, age and salary expected in the first letter. Address: Box 366, FOUNDRY, Cleveland 13, Ohio.

GREY IRON FOUNDRY SUPERINTENDENT
If you have practical experience in floor and squeezer molding, rigging, core making, cupola practice and also are able to read blue prints, there is an excellent opportunity waiting for you in a modern, clean foundry in Milwaukee, Wisconsin territory. If you are able to qualify, then please give age, references, and wages expected. Do not apply if you are not able to meet the above qualifications. Address: Box 376, FOUNDRY, Cleveland 13, Ohio.

FOUNDRY ENGINEERS AND DRAFTSMEN
Having foundry operating or plant engineering experience. Write, enclosing photograph and complete record of education and experience in detail, including previous employers and length of service. State age and salary expected. ADDRESS: LESTER B. KNIGHT & ASSOCIATES, INC., 600 W. JACKSON BLVD., CHICAGO 6, ILL. and 50 CHURCH STREET, NEW YORK 7, NEW YORK.

FOUNDRY SUPERINTENDENT
Thoroughly experienced man in aluminum permanent mold for modern midwest foundry. Magnesium experience helpful. Essentials are ability to handle people and maintain production schedules. Technical background helpful, not required. For a qualified man who probably has at least ten years' experience, salary is open and future unlimited. Bonus plan. Send complete resume in confidence. Address: Box 122, FOUNDRY, Cleveland 13, Ohio.

FOUNDRY METALLURGIST
Wanted for supervisory position by aluminum and bronze foundry in Northern Ohio. AAA-1 Co. Address: Box 182, FOUNDRY, Cleveland 13, Ohio.

INDUSTRIAL ENGINEER
List past experience and also state salary expected in first letter. Must be familiar with foundry work. Address: Box 372, FOUNDRY, Cleveland 13, Ohio.

FOUNDRYMAN
Magnesium foundry in Midwest has opening for practical man with ability to take complete charge of foundry operations. Salary open or share in company. Address: Box 383, FOUNDRY, Cleveland 13, Ohio.

FOUNDRY SUPERINTENDENT

Northeastern Ohio. Conveyor experience for light iron castings, must be a leader able to handle 300 men, increase output. Replies strictly confidential, salary.

BOX 362

FOUNDRY **CLEVELAND 13, OHIO**

SALESMAN
Nonferrous smelter and refiner. State training, experience and references in first letter. Address: Box 332, FOUNDRY, Cleveland 13, Ohio.

CHIEF ENGINEER
SALARY $8000—$10,000
Permanent mold and die cast die design experience in light metals required. Man we want has a sound record behind him and has top management ambitions for the future. Bonus plan. Write in details. Address: Box 121, FOUNDRY, Cleveland 13, Ohio.

Help Wanted

FOUNDRY MANAGER
OR
GENERAL SUPERINTENDENT

Exceptional opportunity for thoroughly qualified graduate engineer, metallurgical preferred, between age 35 to 45, in modern machine tool foundry. Must have substantial knowledge of production methods, incentive, industrial relations and cost control. Present employ 325 people. Capacity about 800 to 1,000 tons per month. Enclose photograph and state complete record of education and experience in detail including previous employment.

BOX 399

FOUNDRY **CLEVELAND 13, OHIO**

Representatives Wanted

SALES AGENT WANTED

Old established grey iron jobbing foundry wants representation in St. Louis. Send complete information with experience and references.

BOX 386

FOUNDRY **CLEVELAND 13, OHIO**

MANUFACTURER'S AGENT
To represent grey iron foundry located in Southwestern Michigan specializing in medium weight grey iron castings, floor, bench and squeezer. Prompt deliveries assured. Write, giving references, experience and contacts. Address: Box 384, FOUNDRY, Cleveland 13, Ohio.

MANUFACTURERS' AGENT
Wanted to sell industrial ovens and furnaces in following territories: New England, Southern Ohio, St. Louis area. Commission basis. Men with technical experience preferred. Address: The Carl-Mayer Corporation, 3030 Euclid Ave., Cleveland 15, Ohio.

REPRESENTATIVE
Calling on foundries, die casting plants and metal industries in Pittsburgh area and part of Pennsylvania. Also man for Illinois to sell products of well established firm. Replies should include previous experience. Address: Box 352, FOUNDRY, Cleveland 13, Ohio.

MANUFACTURERS' REPRESENTATIVES
To represent quality aircraft magnesium foundry. Greater New York area, Middle Atlantic area, Cleveland and Detroit areas. Address: Box 398, FOUNDRY, Cleveland 13, Ohio.

Positions Wanted

MASTER MECHANIC
Experienced modern mechanized foundry, have developed successful preventive maintenance programs; heavy machine shop background. Nine years responsible supervisory experience, references. Address: Box 378, FOUNDRY, Cleveland 13, Ohio.

CLEANING ROOM FOREMAN
Many years' experience in handling cleaning room and inspections. Familiar with all types of steel casting, both open hearth and electric, large and small. Address: Box 387, FOUNDRY, Cleveland 13, Ohio.

FOUNDRY MANAGER
Estimating, sales and cost experience, practical molder, patternmaker and metallurgist. Good executive, can improve quality and costs. Now employed. Address: Box 394, FOUNDRY, Cleveland 13, Ohio.

SALESMAN
Now representing a brass and bronze ingot smelter in Philadelphia. Looking for an additional line to call on ferrous and nonferrous foundries. Please write anytime. Address: W. B. GREEN, 104 EAST ROOSEVELT BLVD., PHILADELPHIA 20, PA.

Positions Wanted

MANAGER—SUPERINTENDENT
Twenty-eight years of gray iron experience and some nonferrous. Outstanding practical and technical background. Have supervised as many as three hundred men, 125 tons daily, production and jobbing, mechanized or semi. Excellent cost man, ability to handle men and can obtain results. Age 47. Address: Box 991, FOUNDRY, Cleveland 13, Ohio.

FOUNDRY MANAGER
or
GENERAL SUPERINTENDENT
Experienced in air furnace, malleable and gray iron. Technical college graduate; patternmaker qualified to design production pattern equipment, core equipment, and hydraulic press straightening dies. Practical experience in sands, molding, coremaking, grating and risering, pouring, scrap analysis, annealing, cleaning and finishing of malleable and gray iron castings. Also qualified to establish workable production control system. Age 43. Desire change for personal reasons. Salary $12,000 per year. Must give thirty days notice. Address: Box 389, FOUNDRY, Cleveland 13, Ohio.

SUPERINTENDENT
Over twenty years' supervisory capacity with present employer desires change. Qualified in fully mechanized or semi-production methods in producing full line automotive castings. Experienced in casting control and modern core production methods. Address: Box 336, FOUNDRY, Cleveland 13, Ohio.

GENERAL MANAGER
Mature, profit-minded, dependable. Has successfully managed four companies—two taken out of the red. Available for service shortly with medium-size company requiring reliable directing ability in management, sales finance and production. Excellent experience, foundry, machine and related lines. Address: Box 222, FOUNDRY, Cleveland 13, Ohio.

FOUNDRY SUPERINTENDENT
Wants charge of grey iron foundry running 10 to 25 per day. Twenty-five years' experience in jobbing and production. Good cupola control and sand slinger operation. Age 47, Good health. Address: Box 403, FOUNDRY, Cleveland 13, Ohio.

IF YOU NEED
A hardworking and progressive supervisor with an alert and inventive mind in your foundry, answer this ad! Graduate mechanical engineer. Age 29. Journeyman, 5½ years' practical experience of machine and floor molding in grey iron and steel foundries, some nonferrous. Good appearance, pleasing personality. Married. Address: Box 368, FOUNDRY, Cleveland 13, Ohio.

FOREMAN—WOOD PATTERNMAKING OR PURCHASING PATTERNS AND CASTINGS
Twenty-two years as foreman and department manager in wood patternmaking including also ten years purchasing patterns and castings, expediting and coordinating. Experience on general machine patterns, power presses, rolling mill equipment, etc. Best of references from wherever pattern equipment was used. Address: Box 209, FOUNDRY, Cleveland 13, Ohio.

FOUNDRYMAN
To take complete charge of small foundry, ferrous or nonferrous, small to medium castings. Well versed in costs, sales, scrap control. Have 27 years' experience in foundry operations. Address: Box 390, FOUNDRY, Cleveland 13, Ohio.

FOUNDRY MANAGER
Twenty-six years in machine tool foundries. Experience covers all foundry operations. Specialized knowledge of foundry cost control, incentive systems, industrial relations, production methods and organization. Foundry consultant on sand and quality control, mechanization, cupola operation and general foundry problems. Age 42, now employed. Address: Box 797, FOUNDRY, Cleveland 13, Ohio.

Positions Wanted

METALLURGICAL ENGINEER
June graduate, veteran, age 33, married, desires position as assistant metallurgist with progressive steel foundry in Western New York, Western Pennsylvania, Ohio or Indiana. Foundry major in college plus some experience in foundry and steel mill. Presently employed in foundry development work. Address: Box 370, FOUNDRY, Cleveland 13, Ohio.

GENERAL CORE ROOM FOREMAN
Jobbing or production core room, large or small work, bench, floor, rollover machines, core blowers. Well versed in all types of core room equipment, sand mixing, coremaking, finishing, and drying of cores. Reliable, hard worker, and good labor relations. Address: Box 395, FOUNDRY, Cleveland 13, Ohio.

MANAGER OR SUPERINTENDENT
Successful background as grey iron foundry manager and superintendent. Well versed in all phases of management, including costs. Address: Box 396, FOUNDRY, Cleveland 13, Ohio.

PERMANENT MOLD AND DIE CAST ENGINEER
Light metals. Experienced in all phases with executive experience. Address: Box 373, FOUNDRY, Cleveland 13, Ohio.

GREY IRON FOUNDRYMAN
Available. Capable, qualified and experienced to direct all phases of foundry activities. Light to medium heavy work. Green and dry sand. Well versed in cupola operation and metallurgy. Fifteen years in present executive position. Middle aged. Good appearance. Pleasing personality. Address: Box 603, FOUNDRY, Cleveland 13, Ohio.

WEIGHT ESTIMATING
Estimating of casting weights furnished by return mail. Accurate, reliable and confidential service. Automatic calculator equipment. Nominal fee. Send blueprints to: CHARLES E. ROLAND, ITASCA, ILLINOIS.

MANAGER OR SUPERINTENDENT
Gray iron foundry experience well versed in all phases of foundry management including costs, sales planning, small and medium heavy castings. 28 years' practical experience. Small foundry preferred. Salary and production bonus. Address: Box 344, FOUNDRY, Cleveland 13, Ohio.

FOUNDRY SUPERINTENDENT
Successful background as superintendent in shops up to 300 men. Excellent record on quality control, organizing ability, production and costs. Technical and consultant experience on sand properties, cupola operation and mechanization. Gray iron, large or small, jobbing or production. Age 43. Address: Box 235, FOUNDRY, Cleveland 13, Ohio.

FOUNDRYMAN
Engineering graduate, experienced in high production grey and malleable iron. Practical knowledge of all foundry operations, molding and core room. Will consider any job capable of doing. Young family man. Address: Box 367, FOUNDRY, Cleveland 13, Ohio.

GENERAL FOREMAN
Large or small castings in grey iron or nonferrous, green or dry sand. 20 years' practical experience in all foundry details. New Jersey preferred. Address: Box 214, FOUNDRY, Cleveland 13, Ohio.

MANAGER—SUPERINTENDENT
Desires position with small or medium nonferrous jobbing or production shop. Will relocate. Fifteen years' experience all phases. Top references. Married and steady. Age 32. Address: Box 340, FOUNDRY, Cleveland 13, Ohio.

NONFERROUS FOUNDRY FOREMAN
With 21 years of experience in aluminum and bronze jobbing; 39 years of age. Desire position in Northern New Jersey. Address: Box 381, FOUNDRY, Cleveland 13, Ohio.

PLANT SUPERINTENDENT
Twenty-five years' experience in jobbing and production of grey iron castings. Thirteen years in executive capacity. Production and sales promotion background in developing small foundries. Age 47, married, no dependents. Good health. Address: Box 404, FOUNDRY, Cleveland 13, Ohio.

Positions Wanted

PERMANENT MOLD SPECIALIST
Offers his own brass fittings process and his personal assistance setting up for production. Correspondence in German language desired. Address: Box 359, FOUNDRY, Cleveland 13, Ohio.

PATTERNMAKER
Both wood and metal work. First-class mechanic on bench and foreman, small, medium size shop. Estimate work, costs also layout for foundry production castings. Wood patterns, master work large or small with usual die and jig patterns including plaster of paris, metal patterns, cost match plate work and core boxes, core blowing or hand ram core box. Address: Box 392, FOUNDRY, Cleveland 13, Ohio.

PATTERN SHOP
Where can make really first class wood and metal patterns. Experienced in both wood, metal and plaster of paris work. This includes match plate casting, core boxes and precision castings. Have most of machinery if needed in new shop, even an outfit to cast plates and core boxes. Start your own shop at low cost. Address: Box 393, FOUNDRY, Cleveland 13, Ohio.

PATTERN SUPERINTENDENT
Well known, desires to locate with a foundry recognizing the need for quality production patterns. Acquainted with the production of match plates and core dryers. Understand the pertinent advantages of different types of foundry and core room production machines. Have originated many new methods in plastic and low melting point alloys pertaining to pattern construction. Understand the accuracy and quality of equipment required for aircraft castings. Can design and rig work for shell molding. Have supervised a most modern pattern shop working with wood, plastic and metal equipment. Believe experience would be valuable either in supervising the production of quality castings or in planning, designing and operating a pattern shop in which management may be proud. Address: Box 400, FOUNDRY, Cleveland 13, Ohio.

Opportunity

OPPORTUNITY FOR CAPITAL
EXPANDING ALUMINUM PERMANENT MOLD FOUNDRY offers excellent growth situation to a bona fide investor. Replies in confidence. Address:

BOX 388
FOUNDRY CLEVELAND 13, OHIO

EXCELLENT OPPORTUNITY
Patternmaker to take active participation in ownership of a pattern shop and aluminum foundry in the New York metropolitan area. Qualifications are: familiar with plaster pressure cast aluminum equipment and wood pattern. The company has been established for 28 years. Reasonable terms for the right person or persons. Address: Box 402, FOUNDRY, Cleveland 13, Ohio.

OPPORTUNITY
Want to contact those who will be interested in a major improvement in mold production, consisting of a patented arrangement whereby the complete cycle of spotting, ramming, strike off vibration and draw is accomplished on a continuous basis and with one actuation of a single air cylinder. The unit is efficient and very simple in construction resulting in economy and speed. Diagrametrical drawings and a written description will be forwarded on request. Address: Box 385, FOUNDRY, Cleveland 13, Ohio.

Wanted-To-Buy

WANTED

BRIDGE CRANES

ARNOLD HUGHES COMPANY

765 PENOBSCOT BLDG. DETROIT 26, MICH.

WOODWARD 1-1894

WANTED
One Ajax Induction Furnace for Steel Melting, with 500 lb. to 1,000 lb. capacity. State shape and best cash price. Address: Box 379, FOUNDRY, Cleveland 13, Ohio.

WANTED
Need for production—Simpson Mixer, Raymond Mill, one or two vibrating screens. Please give full particulars. P. O. BOX 1351 CHURCH STATION, NEW YORK 8, N. Y.

Wanted-To-Buy

WANTED TO BUY

(1) Ten Ton Ladle

(3) Tumbling Barrels 18" x 24"

(1) Herman 4000# Jolt Rollover 30" x 42"

(1) Small Rollover 18" x 18"

(1) #2 SPO Jolt Squeeze Machine

(1) #"0" 18" cupola

(1) Small Core Oven

(1) Double End snag grinder for 2" x 18" wheel 2" arbor

(2) Mulbarrows

(1) 1 Ton Electric Hoist

(1) ¼ Ton Electric Hoist

Please send us your list of idle or surplus equipment.

EMPIRE INDUSTRIAL & FOUNDRY EQUIPMENT COMPANY

BOX 88 DELMAR, NEW YORK

MIXERS WANTED
Used Simpson Intensive Sand Mixers. State size, condition and lowest cash price or immediate acceptance. Address Box 578, FOUNDRY, Cleveland 13, Ohio.

Foundries For Sale

MAGNESIUM FOUNDRY
Located small Oklahoma town. Excellent labor, no union. Building 60' x 130' with clean office. Concrete floor throughout. Excellent equipment. Immediate possession. Several good accounts presently being serviced including government work. Price $25,000. Will consider lease or profit sharing arrangement with experienced foundry manager. Address: Box 1424, Tulsa, Oklahoma.

SMALL FOUNDRY FOR SALE
On New York Central Railroad side track in Lockport, New York. Floor space of moldess approximately 11,000 square feet with exceptional dumping ground for disposal of slag and waste indefinitely at lowest expense over declivity on the land. Considerable foundry equipment thrown in for the price of assessed value of the real estate. Address: JEFFERSON UNION COMPANY, LOCKPORT, NEW YORK.

FOUNDRY FOR SALE OR LEASE
To experienced people who can continue to make our castings. Has eight molding machines, wheelabrator, sand cutter, pattern shop, railroad. Address: CUNNINGHAM MACHINERY CORP., BOX 56, SHREVEPORT, LA.

FOUNDRY FOR SALE
Small brass and aluminum foundry located in large midwest industrial city. Doing excellent business, room for expansion. Includes nearly new building, equipment and land. Excellent opportunity. Price $8500. Address: Box 338, FOUNDRY, Cleveland 13, Ohio.

FOUNDRY FOR SALE
Up-to-date going foundry in North Central Wisconsin. Fully equipped. Opportunity for several good foundry men. Address: Box 371, FOUNDRY, Cleveland 13, Ohio.

IRON AND BRASS FOUNDRY AND MACHINE SHOP
In Eastern Pennsylvania, eight frame buildings, five acres. Iron capacity seven tons per day, brass capacity one-half ton per day. Address: Box 377, FOUNDRY, Cleveland 13, Ohio.

FOR SALE
Brick and steel foundry, Southern Illinois, 160 x 320 feet, overhead monorail water transportation available. Ideal for mechanized operation, contains equipment. Address: Box 391, FOUNDRY, Cleveland 13, Ohio.

Employment Service

EMPLOYMENT COUNSEL, INC.

"All The Name Implies"

JOHN COPE, Manager Foundry Dept.

Recruiting men for employers in the foundry industry throughout the nation. Openings in steel, Malleable, Gray Iron and Non-Ferrous—Jobbing and Production. Salaries to $20,000.

PLANT MANAGERS	SUPERINTENDENTS
GENERAL FOREMEN	MOLD FOREMEN
CORE FOREMEN	MELTING FOREMEN
CLEANING FOREMEN	MAINTENANCE FOREMEN
PATTERN FOREMEN	METALLURGISTS
INDUSTRIAL ENGRS.	TIME STUDY ENGRS.

And all other Administrative and Sales Positions.

WRITE or CALL for registration.

Completely Confidential

SUITE 500
CHICAGO 2, ILLINOIS

7 WEST MADISON ST.,
FINANCIAL 6-2100

SALARIED PERSONNEL

$3,000-$25,000. This reliable service, established 1927, conducts confidential negotiations for high grade men who seek a change of connection under conditions assuring if employed full protection to present position. Send name and address only for details. Personal consultation invited. Address: JIRA THAYER JENNINGS, 241 ORANGE STREET, NEW HAVEN 10, CONN.

Accounts Wanted

CASTINGS SALESMAN

Experienced castings salesman would like a commission sales contract with a dependable production malleable iron foundry for Northern Ohio and Michigan. Address: Box 238, FOUNDRY, Cleveland 13, Ohio.

For Sale

FOR SALE

One-third interest in iron foundry. This is a going business in Los Angeles county. Three partners, having a substantial drawing account monthly. Can possibly buy a half interest. Seller retiring. Address: MURPHY, 5921 LEEDS AVENUE, SOUTH GATE, CALIF.

FOR SALE

1—Detroit electric furnace, type CC-600K.W. 3000 lb. capacity. Two linings. Two shells. New Original crate. No transformer. Price $14,500.00

BOX 333

FOUNDRY CLEVELAND 13, OHIO

STEEL ELECTRIC MELTING FURNACES

Available Immediately

20 ton Electromelt Furnace—New in 1950
15 ton Heroult Furnace

BALCHER MACHINERY COMPANY
1884 S. COMPTON, CLEVELAND HTS. 18, OHIO
TEL: FAIRMOUNT 1-1186

FOR SALE

One Fisher Furnace now operating lined for #200 crucible. Will take a #400 crucible. A-1 condition. Price: $600 complete with motor and blower. Address: REYNOLDS FOUNDRY, P. O. BOX 838, TORRINGTON, CONN.

EQUIPMENT FOR SALE

One used Model NC-2 Royer Sand Separator and Blender, 440 volt, 3 phase, 60 cycle, rubber tired wheels, 25 ft. cord, ⅝ in. space belt, in A-1 condition, purchased new July, 1950. Address: STURGIS FOUNDRY CORPORATION, BOX 408, STURGIS, MICHIGAN.

FOR SALE

In Pittsburgh District: Established electric steel casting and machine shop, doing million dollar business annually, with one-half million in equipment and buildings. Steady year around business. Address: ABBATICCHIO AGENCY, 212 FIFTH STREET, ELLWOOD CITY, PENNSYLVANIA.

For Sale

FOR SALE

Riehle Testing machine, 80,000# tensile and compression.
Oil filters, Sperry, 18" x 18", plate and frame, closed delivery, 11 chambers.
Simpson sand mixers, #0, #1, #1½, #2, #3.
Miscellaneous: Screens, grinders, pulverizers, all types conveyors, tyler rotap screen, etc.
LOW PRICE QUICK DELIVERY

CONSOLIDATED PRODUCTS CO., INC.
13-20 PARK ROW NEW YORK 38, N. Y.
TELEPHONE: BARCLAY 7-0600

FOR SALE

6 MILWAUKEE JOLT SQUEEZE MOLDING MACHINES NO. 104. THESE MACHINES ARE OF THE LATEST MODELS AND ARE IN EXCELLENT CONDITION. PRICE $375.00 EACH, F.O.B. MILWAUKEE, WISCONSIN.

PIONEER FOUNDRY CORPORATION
1815 S. FIRST ST. MILWAUKEE 4, WIS.

FOR SALE

Hines Aluminum Pop-Off Flasks, numerous sizes including jackets. Will furnish sizes upon request. All flasks in good condition priced reasonably. Any one interested contact: PURCHASING DEPARTMENT, RICHMOND RADIATOR COMPANY, NEW CASTLE, DELAWARE.

FOR SALE

Soil pipe factory 2" and 4" pipe and fitting patterns. All master patterns, machinery and portable building. Production $1,000 per day. Reasonable and terms. Address: 2008 PORTLAND AVENUE, SHREVEPORT, LA., TELEPHONE 3-4533.

FOR SALE

1—Type FS-347 Ingersoll Rand Centrifugal Motor Blower rated at 5200 CFM, 3565 R.P.M. at 1.25 pounds Discharge Pressure with 40 H.P., 220 V., 3 phase, 60 cycle General Electric Motor. Excellent Condition. $1,000 F.O.B. Milwaukee, Wisconsin.
4—Whiting 3-Wheel Slag Buggies with single end shank—4.5 cubic foot capacity. Excellent Condition. $200 each, F.O.B. Milwaukee, Wisconsin.

MID-CITY FOUNDRY COMPANY
1521 WEST BRUCE STREET
MILWAUKEE 4, WISCONSIN

FOR SALE

Motors, Generators, Transformers from 1 HP to 2500 HP
World headquarters for T.E.F.C. and explosion proof motors.
World's largest inventory.

ELECTRIC EQUIPMENT CO.
ROCHESTER, N. Y.

FOR SALE

All types foundry equipment available for immediate delivery. Write us your need. SEND FOR COMPLETE LISTING.

EMPIRE INDUSTRIAL & FOUNDRY EQUIPMENT COMPANY
BOX 88 DELMAR, NEW YORK

CLASSIFIED ADVERTISING

For Sale

FOR SALE

1—Stewart No. 5 Stationary Furnace.
1—Pedestal Grinder with 5 H.P. Motor.
2—Black & Decker portable 8" Grinders, 4000 RPM.
1—Black & Decker 9" Disc. Sander.
1—Whiting Slag Ladle.
1—Worm Geared Covered Ladle, 400 to 600 lbs for Pouring Device.
1—7 Ton Worm Gear Ladle 47" Top Dia., 43" Bottom Dia., 48½" High.
10—Ladles from 200 to 800 lb. cap.
2—Mixing Ladles U Type, 3000 lb. cap.
7—Modern Equip. Worm Gear Square Ball Cylindrical Covered Ladles, 24" x 26", 800 lb. cap.
1—Jeffrey Sand Conditioner.
1—Simplicity Sand Conditioner.
1—Beardsley & Piper Model "S" Screenarator
1—Beardsley & Piper Model "M" Screenarator
1—JFL International Power Jolt Foot Lift Machine.
3—Adams Jolt Squeezers.
1—Osborn Jolt Squeezer 76-J.
1—JDP., International Jolt Stripper, 600 x 8
1—International "G" Machine 20 x 8.
1—Osborn Bumper 24 x 36.
1—International Jolt Squeezer.
1—Tabor Jolt Strip Machine.
1—U. S. Plain Bumper, Model PJ, 30 x 42 table
1—International HJ. 20 x 4".
1—International HJ. 20 x 6"
1—International Type "G" Rollover Machine 24 x 10, Portable.
1—20" Gyratory Elec. Riddle.
1—24" Elec. Riddle.
3—Universal Elec. Riddles.
1—American Sand Cutter Machine Size 89/70 M
1—Sprue Cutter with 2 HP. Motor.
1—36 x 54 Late Model Whiting Tumbling Barrel with Jones Speed Reducer & 7½ HP. Motor
1—Automatic Lift Truck & Charger.
1—Lyon-Raymond Hyd. Lift Truck 2500 lb. cap
Chipping Hammer.
1—Wells Metal Band Saw Type 9M42.
1—General Blower Motor, 3 HP., 16 oz. pressure, 220 or 440, 3 phase, 60 cycle, 375 CFM.
1—#1 Demmler Core Blower.
1—Fairbanks Scales, Movable Platform.
1—Sand Blast Generator Tank.
2—New Carbide Furnace Covers, 30" dia., 8" hole.
1—¾ Heavy Duty Elec. Drill.
1—½ Heavy Duty Elec. Drill.
77 Set—Truscon Pressed Steel Flasks, 15 x 20 8 Cope, 3 Drag.

HAYNES FOUNDRY EQUIPMENT CO.
814 ADA STREET KALAMAZOO 52, MICH.

FOR SALE

JOLT-STRIP MACHINE—Herman, 6000# series 48 x 54 table, 12" draw. Late.
JOLT STRIPPER—Osborn, Model 405, 21 X 53.
JOLT ROLL OVER—Osborn, Model 406 36 X 24.
JOLT STRIPPER—Osborn, Model 406, 36 X 52.
R-C POSITIVE BLOWER 12 X 20, 20 hp.
R-C POSITIVE BLOWER 22 X 66, 75 hp.
V.C.G.—3 SUPER GYROSET SHAKE OUT, 6' X 8' deck, complete.
JOLT SQUEEZE PIN LIFT MACHINE—Int'l PKL 12—portable.
SAND CUTTER—Am. Model AA, #1111, 15 hp, 220/440 v.
(2) PEDESTAL GRINDERS, Webster & Perkins—1200 rpm.
STAND PEDESTAL GRINDER—Everett.
FLASKS — STERLING WHEELBARROW ROLLED STEEL—Cond: like new, priced right.
2(two) Sets 32 X 48 6" cope 6" drag
12(twelve) Sets 32 X 48 6" cope 8" drag

ALLIED MATERIALS HANDLING CO.,
4657 SPRING GROVE CINCINNATI 32, O.

FOR SALE

1948 INVOICE PRICE

Unused 90 inch cupola, skip hoist charger, blower with automatic controls all in original container Purchased as a unit.

UNITED STATES STOVE CO.
SOUTH PITTSBURG TENNESSEE

For Sale

FOR SALE

MOLDING MACHINES
8—13 x 8 Tabor power squeeze flask lift machine split pattern type.
2—Deuscher Stationary jolt squeeze.
2—SPO #611B Stationary Oscillating Jolt Squeeze Strippers.
4—#610 Johnston & Jennings Air Jolt Rollover Draw Portable 24 x 30 table.
1—#815 Johnston & Jennings Air Jolt Rollover Draw 30 x 40 table.
1—Tabor 36 x 50 table Air Jolt Rollover Draw, 3000# capacity.
1—International G 24 x 10 air jolt and rollover, foot draw, portable.
2—International PKL 14"-5½" Jolt Squeeze Pin Lift.
3—Tabor Pedestal Core Rollover Hand Ram Rollover Draw 14 x 20 table 8" draw.
BLOWERS FOR CUPOLAS AND FURNACES
2—15 HP Spencer-Turbine 2260 CFM at 16 oz.
10—High temperature blowers 1400° F. 9000 to 15000 C.F.M.
2—#7½ Roots rotary blowers—27 x 81—14000 CFM.
1—Connersville rotary blower 22 x 66 45 cu. ft. per revolution 9000 CFM.
Maxon-Premix Blowers for Gas ¼ to 1 HP.
2—5 HP 20-oz. Spencer Turbine Blowers.
2—2 HP 20-oz. Spencer Turbine Blowers.
2—#7½ Rotary Blowers 27 x 81, 14000 CFM.
METAL MELTING EQUIPMENT
5—1000# open flame brass melting furnaces, gas fired.
1—Hausfeld 2000# aluminum capacity furnace, barrel type, open flame, oil fired.
New 32" to 41" dia. shell cupolas made to order.
MISCELLANEOUS
1—Stoney crane type shakeout.
1—Dings type M magnetic separator.
1—NC-4 sand separator.
1—NB-2 sand separator.
1—#1 Demmler core blower.
2—#16 Roto-clone units complete.
25 Tons steel flasks in sizes from 26 x 26 to 60 x 60.
1—McLeod Small Sand Blast Barrel 24 x 24
1—36W Wet Type Roto-Clone 34000 CFM.
1—24W Wet Type Roto-Clone 13000 CFM.
Complete stock of rebuilt mill and dust exhaust blowers.

CLIFTON MACHINERY COMPANY
1023 W. SIXTH ST. CINCINNATI 3, OHIO

FOR SALE

2 Simplicity Shakeouts 3' x 5' new in 1948 Used very little $700.00
1 Howe Platform Scale, 4' x 5', 4,000 lbs capacity, electric $350.00
1 Simplicity Shakeout, 3' x 3' $660.00
5 Lewis-Shepard Jack Lift Trucks, 4,000 lbs capacity, Hydraulic, new 1950 ....$150.00
1 Automatic Transporter, Electric, 4,000 lbs capacity, recently rebuilt $375.00
1 Roll 200' 18", 7 ply, 35 oz duck, ⅛" x 1/16" rubber covered. NEW $700.00
1 Roll 400' 30", 6 ply, hot sand belt, ⅛" x 1/16" rubber covered. NEW $1600.00
LARGE ASSORTMENT OF HINES ALUMINUM POP OFF FLASKS AND JACKETS. NEW AND USED. PRICED LOW.

AAA SALVAGE COMPANY
856 EDDY ROAD CLEVELAND 8, OHIO

EQUIPMENT FOR SALE

1—Model AM American sandcutter— size 74-50. Excellent condition $1500.00
2—SPO #506 jolt rockover draw molding machines. Practically new .....$1400.00 each
1—SPO jolt pin lift machine #305—perfect condition $400.00

PROSPECT FOUNDRY COMPANY
1225 WINTER ST. N. E.
MINNEAPOLIS 14, MINN.

FOR SALE

1—International type PK Jolt Squeeze Pin Lift, 18" cylinder, 8" lift

RAY P. SCULLY
SCULLY MACHINERY & EQUIPMENT CO.
767 MILWAUKEE AVE. CHICAGO 22, ILL.
PHONE: CANAL 6-0314

FOR SALE

One 15" CONTINUOUS AMERICAN WHEELABRATOR TUMBLAST — Type R-15 complete with electrical equipment 220V-3 ph—60 C. excellent condition
One Simplicity Model "C" 2' x 6' single deck Gyrating screen complete with motor—like new
One 3 ft. Blystone mixer with 1 H.P. motor
One Inspection belt conveyor, 24" w x 18'0" long—Mathews—with Drive unit
One Penn Dumping bucket—20 cu. ft. capacity—new
Two Receiving ladles—one Whiting—one Modern 2000# capacity

WELLS MANUFACTURING COMPANY
788 N. AUSTIN AVENUE SKOKIE, ILLINOIS

FOR SALE

2—4000# List Toters—Battery Powered
1—Automatic Battery charger
1—10 H.P. Motor and V Belt drive
1—60' Displacement Gardner-Denver upright
1—85' Displacement V Type Gardner-Denver Air Compressor, 15 H.P. Motor with V Belt Drives

All shipped FOB Kansas City, Missouri

1—400# Melting Reda Furnace—shipped FOB Brooklyn, New York

F. R. WESTWOOD
6398 THOMAS KANSAS CITY, MO.
PHONE—FLEMING 2264

FOR SALE

8' American Wheelabrator Table #2 with 8-24" Multitables complete with 5 H.P. electric motor, blower, dust tube collector. Price $3750.00
Sanditioner portable #1 Jeffrey capacity 10-15 ton of sand per hour. Price $450.00
Sand blasting room walk in size 13' x 7' with 2000 pound McLoud generator, Price $575.00
Sly Dust collector 6 hopper, 7500 CFM.

M. ELSTEIN
141 MANGIN STREET NEW YORK 2, N. Y.

FOR SALE

2—Herman Rollovers, 40 x 60"
2—Davenport Jolt Strippers # 34AJS
Jolt Squeezers: SPO, Osborn, Milwaukee, etc.
Large Rollovers: Johnston & Jennings, Davenport Cort Ovens, all sizes.
Annealing Furnaces
3—Sand Slingers. Excellent condition
1—Speed Muller #60-41 with Sand Cooler and Skip Hoist.
1—Rotary Oil Fire Sand Dryer, 20' long x 42" dia.
Ladles: 6 tons to 1 ton
4—Grinders: 20 HP Black & Decker, 7½ HP Hammond
Blowers: all kinds. Allis Chalmers 8500 CFM
100 tons Steel Flasks. Send for list.
Air Compressors: 30 HP and down
2 ton Electric Crane, 18' span, 3 phase
Complete Mechanized Foundry
Overhead Sand System
Complete Dietert Sand Testing Laboratory
SEND FOR OUR LATEST FOLDER

UNIVERSAL MACHINERY & EQUIPMENT CO.
320 EAST BROAD ST. SHILLINGTON, PA.
PHONES: READING—3-0311—4-0146
R. B. HARRISON, FDRY. MGR.

SAND RECLAIMING SYSTEM

Link-Belt complete unit consists of 2 storage bins with vibrators, sludge tanks and pumps, gas fired sand dryers, 2 bucket elevators, with 2 Clearfield mullers. Complete electrical controls. Original cost over $200,000.00. May be seen in place at Erie, Pennsylvania.

ACME EQUIPMENT CO., INC.
126 S. CLINTON ST. CHICAGO 6, ILLINOIS

PHONE ANDOVER 3-3430

FOR SALE

CORE BLOWER—Champion, Model CB 400 1943.
GOGAN BRINELL TESTING MACHINE, Stationary, Floor type, model 2133, table 27½" x 24" x 7" high.
SPENCER TURBO BLOWERS—1000 CFM @ 24 oz.—2250 CFM @ 16 oz.—2850 CFM @ 16 oz.
ROTO-CLONE units—24W & 36W, with sludge ejectors.
VIBRATORS—Osborne 1⅝" & 2".
CONVEYOR—6" width, 4" centers, hevi duty, 1000 ft.
FAIRBANKS MONORAIL SCALE — automatic, 2000 lb.
WELDED STEEL POURING CRUCIBLES — New.
AIR COMPRESSOR—Penna. 100 hp., 14 x 12.
AIR COMPRESSOR—Ingersoll-Rand, 75 hp., 14 x 12.
Bottom Dump, Sand Buggies.
Exhaust Fans—to 60".
MOTORS—TEFC & TEFCXP.
Fire Extinguishers—CO2.
Exhaust Blowers—all sizes.

ALLIED MATERIALS HANDLING COMPANY
4657 SPRING GROVE CINCINNATI 32, OHIO

FOR SALE

1—Milw. Jolt Pin-Lift, 32" x 38" Table—New
4—SPO #110 P.J. Jolt Squeezers
1—Coleman 8 Drawer Core Oven—Gas Fired
8—Melting Furnaces, #70 Cruc., Gas Fired
1—Fisher #400 Furnace, Elec. Tilt, Gas Fired
1—Fisher Blower, Size L 50
2—Fisher Blowers, Size J 30
1—Roots Blower—Size ½
Hood & Exhaust System over Melting Area With ABC Series 30 Exhaust Fan
49—#70 Sil. Carb. Crucibles
2—#400 Sil. Carb. Crucibles
Miscellaneous Firebrick, Cement Furnace Covers
1—Six Ton Cap. Crane
1—Thwing Elec. Pyrometer
3—Bench Rammers
287—Iron Pouring Weights
275#—Foseco Alum. Degasser #7

THE LIQUID CARBONIC CORPORATION
3100 S. KEDZIE AVE. CHICAGO 23, ILLINOIS
BI-7-8000 P. A. FIRNBACH

FOR SALE

TURBO BLOWERS WITH MOTORS

CFM	PRESS.	MAKE	CFM	PRESS.	MAKE
4500	16 oz.	G.E.	675	16 oz.	Spencer
4000	32 oz.	Spencer	660	20 oz.	A-B
3500	40 oz.	Spencer	500	10 oz.	No. Am.
2800	1 oz.	Spencer	400	4.3 oz.	Spencer
2700	16 oz.	No. Am.	400	16 oz.	Spencer
2700	16 oz.	Spencer	340	20 oz.	A-B
2500	7 oz.	Sturt.	320	12 oz.	Spencer
2200	16 oz.	No. Am.	225	16 oz.	Spencer
2000	2½ oz.	Spencer	180	15 oz.	Spencer
2000	1 oz.	Spencer	9100	7" SP	Sturt.
1150	20 oz.	No. Am.	1100	4½" SP	Bayley
800	8 oz.	No. Am.	100	7" SP	Spencer

THE MOTOR REPAIR & MFG. CO.
1552 HAMILTON AVE.
CLEVELAND 14, OHIO

FOR SALE

Model 350 Wheelabrator Tumblast
36" x 36" barrel with elevator.
Motor drive with A.C. motor.

BOX 401
FOUNDRY CLEVELAND 13, OHIO

FOR SALE

Lindberg Pit type heat treat furnace. Size 48-72-60 complete unit.
Quince tank, baskets, burners, etc. All instruments may be inspected at our plant. Never used.

JAS. H. MATTHEWS CO.
1315 W. LIBERTY AVENUE PITTSBURGH, PA.
PHONE: LOCUST 1-3456

FOUNDRY EQUIPMENT

BLOWERS AND FANS

Spencer Turbo Blower, 4500 CFM @32 oz. Serial 44788—220/440 V., 60 HP, G.E. triclad induction motor. New Dec., 1946.

Propellair type CD, 30" direct connected 4 blade fan, ½ HP R & M 3/60/220/440 V., 1750 RPM, ring mount.

Similar to above, 4 blade, 28", 1 HP, G. E., 3/60/220/440 motor

Similar to above, 6 blade, 24" fan, 1 HP Louis Allis 3/60/220/440, 1740 motor

CORE BLOWERS

2—Demmler 3E Drop Away Draw. type, Serial #1672-2252

1—Air operated Core Rollover

CORE OVENS

1—Coleman Vertical 24" x 96" racks, oil fired flametrol Brown recording pyrometer, 36' height

1—Dispatch Tower, 23" x 88" shelves, 31' high oil fired Brown recording pyrometer

1—Drying Systems, Inc. 24" x 48" trays. Oil fired flametrol Brown indicators

1—Dispatch Batch type 4 compartment 2 Burner 9—51" x 72" x 60" racks and hydraulic lift truck

Ovens located in Wisconsin

CRANES

5 Ton P & H Overhead traveling crane, double girder cab operated 30' — 6" span 15' lift, 3 motors 3/60/220 V., A.C., Serial 12946B. New 1946.

10 Ton Northern Bridge Crane, box frame double girder, fish belly, 230 V., D.C. 54' 7½" wide C to C of bridge wheels, cab operated 3 motors

6 Ton Shepard Niles Bridge Crane, inner running trolley double girder transfer crane 25' 2" span, 10' lift floor control 4 lifting hoods 6' 1⅝" apart. 2 speed 15-30 FPM 3/60/440 A.C. side rails, wiring switches etc., new 1948.

YARD CRANES

Hughes Keenan MC-4 15,000# capacity Truck Crane, solid tires, all weather steel cab and heater. Telescopic boom 12'—18' gasoline engine. Excellent condition

Krane Kar, 10,000# Model AX, telescopic boom 12'—18' solid tires, gasoline engine. Rebuilt, guaranteed

GRINDERS

Fox Swing Frame Grinder, with 10 HP G.E. Induction motor 220/440 volt, 60 cycle, 3 phase

HOISTS

500# Electrolift ¾ HP 3/60/220 motor 2" trolley and current collectors, 15' lift, 30 FPM

1000# Detroit Monorail Hoist for 3½" track, 1 HP 3/60/220-440 V. motor push-button control with contactors

1000# Cleveland Tramrail Low Headroom Electric Hoist with trolley and current collector 1½ HP 3/60/220 motor for 3¼" trolley

2000# Detroit Electric Hoist with 15' rail for jib crane for wall mounting

6000# Lo-Head Hoist, Model HB3. Rebuilt and guaranteed

AIR HOISTS

2000# Chicago Pneumatic Air Hoist, "Little Giant" Model A. Serial CP330648

4000# Chicago Pneumatic Air Hoist "Little Giant". Serial CP 284433

AIR TROLLEYS

2—Ingersoll Rand 2000-6000# capacity motor driven Trolleys

LIFT TRUCKS

Mobilift Forks—2000# capacity. 30" load. Centers 63" collapsed. Height 79" lift, self starters. Late models

Mobilift Forks 3000# capacity as above late models

Ross 19HT 6000# high lifts 14' lift 48" forks, pneumatic tires. Rebuilt guaranteed

Ross 15HT, 15000# capacity 15' lift 54" forks 11' 6" collapsed height, pneumatic tires. Rebuilt, guaranteed

Baker Hy-lift Platform Truck, 10,000# capacity, Model H5-60 with H36 spec. ready power 27 x 60" plafform

2—Baker 6000# gasoline fork. Lifts KMH 60, 120" lift, 88" collapsed height 42" fork, solid tires. Rebuilt and guaranteed

MELTING EQUIPMENT

5—New Stroman 1000# aluminum Melting Furnaces, Type SD-1. Oil fired manual tilt type completely lined, in original crates, with 3 HP Stroman Blowers.

MOLDING MACHINES

1—Hermann Rollover Pattern Draw 20 x 30" with bumper 6" cylinder. New 1942. FOB Erie, Pa.

1—Hermann High Speed Jolt Rollover, 4000#, 36 x 60" with 32 x 48" bumper, 13" cylinder, with pattern device. New 1940. FOB Erie, Pa.

1—Tabor 1000# Rollover Molding Machine 30 x 51". New 1944. FOB Erie, Pa.

2—Beardsley & Piper Champion Pin Lift push-offs 44" x 44" — 12" draw. New 1948

2—Beardsley & Piper Champion Pin Lift push-offs, 32X36", 8" draw

2—Johnston & Jennings Jolt Pin Pushoffs, 8" jolt cylinder

1—Johnston & Jennings Rollover Draw 30" x 42" plate, 12" draw

1—Osborn Portable Jolt Rollover Pattern Draw model 601-13, 30" x 24" flask size, 10" draw, 900# cap. FOB Ordill, Ill.

1—International 13" PJS. Jolt Squeeze Molding Machine. Stationary 18x26" table

MOLDING UNIT

1—Osborne Jolt Squeeze Molding Machine. Ser. #11791B—23" x 24" table and Osborne 814P Rollover. Serial 10953C 17" x 31" table. These two machines are a unit with overhead sand hoppers one with belt feed to squeezer, hopper feed to rollover. FOB Erie, Pa.

MULLERS

Simpson #3 Model H Style B Intensive Mixer cooling system and rotary screen. in excellent condition

2—Clearfield #2 Mullers C10 Serial 169A-169B Timken bearings with motors and controls. FOB Erie, Pa.

SHAKEOUT

3' x 5' Simplicity Shakeout 3/60/220 motor. Excellent condition. Present location Erie, Pa.

WHEELABRATOR

1—36 x 42" American Wheelabrator Series 370 tumblast. Used very little 15 HP main motor 3/60/330/440 V.

ACME EQUIPMENT CO., INC.

126 S. Clinton St. **Chicago 6, Ill.**

Phone: ANdover 3-3430

CLASSIFIED ADVERTISING

For Sale

FOR SALE
SAND BLAST EQUIPMENT

Wheelabrators-Tumblast size 48 x 42
Hurry, 2 more have been released for immediate sale priced 3 to $4000.00.
Wheelabrator size 48 x 48. $6000.00.
Wheelabrator 27 x 36 Tumblast good condition—rubber belt. $3000.00.
Pangborn ES-207 Blast Cleaning Cabinet used for strip steel or bar stock. $1750.00.
Pangborn 8 ft. table with 7 28" tables. $4000.00.
Sand Blast Cabinets, pressure tanks, dust collectors and blowers. All sizes.
Contact us for your sandblasting needs or any surplus sandblasting parts and equipment you have for sale.
Will accept your small machines as trade in on any of the above equipment.

DIAMOND SALES INC.
5654 WEST JEFFERSON
DETROIT 9, MICHIGAN

FOR SALE

2—Type RM 375# Stromann Gas Fired Melting Furnaces with accompanying crucibles and Bose Blocks.

1—#1603 Stromann Blower, Totally Enclosed and motor for above Furnaces.

THE PYLE NATIONAL COMPANY
1334 N. KOSTNER AVENUE
CHICAGO 51, ILLINOIS

FOR SALE

One lectromelt UT 500 lb. top charge furnace. Has had very little use. Address: Box 375, FOUNDRY, Cleveland 13, Ohio.

FOR SALE

Five #683 Johnston and Jennings bolt pin lift molding machines 4000 lbs. each. Less than two years old, in good condition. Address: RIVERSIDE FOUNDRY, BETTENDORF, IOWA.

YOUR CLASSIFIED ADVERTISEMENT IN FOUNDRY BRINGS RESULTS!

IF YOU ARE SEEKING A CHANGE OF POSITION TO BETTER YOUR SITUATION AND ARE QUALIFIED FOR A BETTER JOB, TELL THE 45,000 READERS OF FOUNDRY ABOUT IT.

DON'T "HIDE YOUR LIGHT UNDER A BUSHEL"—THERE ARE TIMES WHEN A MAN SHOULD TALK ABOUT HIMSELF AND THERE ARE A LOT OF MEN QUALIFIED FOR BETTER POSITIONS WHO DO NOT KNOW HOW TO GO ABOUT IT OR WHERE TO SEEK HIGHER RESPONSIBILITIES.

YOUR CLASSIFIED ADVERTISEMENT IN FOUNDRY WILL BE WIDELY READ AND THE RESULTS MAY SURPRISE YOU!

IT COSTS BUT LITTLE. WHY NOT RUN AN ADVERTISEMENT ABOUT YOURSELF IN TWO OR THREE ISSUES?

WRITE
FOUNDRY
CLASSIFIED ADVERTISING DEPT.
PENTON BLDG., CLEVELAND 13, OHIO

FOR SALE

1—24″x24′ Belt Conveyor, 5 H.P. 220/440V. 3ph. 60 cy.
1—#405 Osborn Rollover and Pattern Draw Molding Machine.
1—International Type GS Jolt ram, rollover and pattern draw molding machine, 28″x36″ table.
1—6000# Herman Rollover & Pattern Draw. Rollover 42″x90″, 5400# capacity. Jarring Machine 40″x84″ table and plate, 9400# capacity.
7—#601-13 Osborn Jolt Rollover & Pattern Draw Molding Machines.
6—#2047-4 Osborn Jolt Rollover & Pattern Draw Molding Machines for cylinder head core production.
9—#2048 Osborn Rollover Molding Machine for core closing.
2—30″x40″ Tabor Jolt Rollover, 1000# cap. 12″ draw.
1—#147 Osborn Rockover & Draw Machine for long jobs.
2—#146 Osborn Rockover & Draw Machines.
4—#814-P Osborn Jolt Squeeze Pin Lift Molding Machines.
3—#2166 Spo Jolt Squeeze Pin Lift Molding Machines.
5—Champion Draw Power Pushoff Machines 10″ draw, 38″x40″ table.
1—#1 Demmler Core Blower—New.
1—#3 Demmler Core Blower.
10—#92 Osborn Core Blowers.
1—Kane & Roach Wire Straightener, 3/16″ to ½″ wire, 7½ H.P. 440V.
1—3 H.P. double stand grinder, belt driven.
2—3 H.P. Blower for furnaces, 16 oz.
2—50 H.P. Spencer Turbine Cupola Blowers 7350 CFM, 16 oz., 220/440/3/60.
1—20 H.P. North American Turbine Blower, 1900 CFM, 24 oz., 220/440/3/60.
4—International Type JFL Jolt Ram, Foot lever lift molding machines.
1—4′x10′ Robbins Shake-out with 7½ H.P. motor.
2—Jeffrey Type 3 Vibrators for shake-outs.
3—Tumbling mills 30″x60″.
1—500# Monarch Aluminum Hand Tilting Furnace.
1—Eclipse Salt Bath Furnace, M-225, gas fired.
1—Revolving Core Conveyor Table (Bush Lawrence) Like new.
2—Fins Cleaning Machines (Ireland) for cleaning fins on castings.
1—Pig Mold Conveyor 74′ lg. (Link-Belt).
1—Jones Worm Gear Reducer, driving shaft 900 RPM, Ratio 8 to 1 Mounted on C.I. Base with 15 H.P. Motor 3ph. 60 cy. 440V. 1150 RPM.
2—Micromax Instruments Leeds & Northrup Temperature Control.

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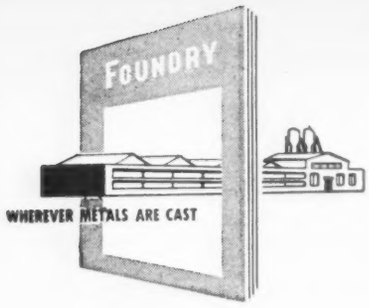

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ADVERTISING

A

Acheson Colloids Co. 197
Acme Foundry Co. 307
Adams Co., The 215
Air Reduction 88
Ajax Electric Co., Inc 188, 192
Ajax Electric Furnace Corp. 188, 192
Ajax Electro Metallurgical Corp. 188, 192
Ajax Electrothermic Corp. 188, 192
Ajax Engineering Corp. 188, 192
Ajax Flexible Coupling Co., Inc. 93
Allied Chemical & Dye Corp., The Barrett Div. 75
Allied Chemical & Dye Corp., Semet-Solvay Div. 268
Allis-Chalmers 69
Alloy Metal Abrasive Co. 311
Alter Co. 300
Aluminum Co. of America 16
American Blower Corp 20, 21
American Bridge Div., U. S. Steel Co. 308
American Clay Forming Co. 281
American Gum Products Co. 314
American MonoRail Co., The 185
American Optical Co., Safety Products Div. 68
American Smelting & Refining Co. 314
American Smelting & Refining Co., Federated Metals Div. 91
American Wheelabrator & Equipment Corp. 14, 15, 179, 239
Anderson Pattern, Inc. 292
Archer-Daniels-Midland Co., Foundry Products Div. 4, 5

B

Babcock & Wilcox Co., The, Refractories Div. 29
Bakelite Co., A. Div. of Union Carbide & Carbon Corp. 35
Baroid Sales Div., National Lead Co. 263
Barrett Div., The, Allied Chemical & Dye Corp. 75
Bartlett, C. O., & Snow Co., The ..... Back Cover
Bassichis Co., The 300
Bay State Abrasive Products Co. 207
Bay State Crucible Co. 313
Beardsley & Piper Div. of Pettibone Mulliken Corp. 165, 166, 167, 168
Bell, M. A., Co. 304
Belmont Smelting & Refining Works, Inc. 297
Beryllium Corp., The 250
Birmingham Committee of 100 278
Black, Sivalls & Bryson, Inc. 41
Blastcrete Equipment Co., Inc. 306
Brummeler Steel Products Corp. 305
Buckeye Tools Corp. 224
Buffalo Pattern Works, Inc. 152
Burdett Mfg. Co. 303
Butler Bin Co., Carscoop Div. 209

C

Calumet Steel Castings Corp. 299
Campbell-Hausfeld Co., The 282
Cannon Vibrator Co. 274
Carborundum Co., The 36, 37, 64, 65, 284
Carl-Mayer Corp., The 19
Carman, Edwin S., Inc. 300
Cast-Master, Inc. 304
Central Pattern Co. 286
Centrifugal Casting Machine Co. 314
Chicago Pneumatic Tool Co. 74
Christiansen Corp. 47
City Pattern Foundry & Machine Co. 205
Clark Equipment Co., Industrial Truck Div. 283
Clayton-Sherman Abrasives Co. 96
Clayton Silica Co. Div. of Concrete Materials Co. 313
Clearfield Machine Co. 92
Cleco Div. of The Reed Roller Bit Co. 60
Cleveland Chaplet & Mfg. Co. 310
Cleveland Crane & Engineering Co., The, Cleveland Tramrail Div. 42
Cleveland Flux Co., The 155
Cleveland Metal Abrasive Co., The 148
Cleveland Quarries Co., The 214
Cleveland Standard Pattern Works, Inc 198
Cleveland Tramrail Div. The Cleveland Crane & Engineering Co. 42
Cleveland Vibrator Co., The 267
Coles Cranes, Inc. 299
Combined Supply & Equipment Co., Inc. 301
Concrete Materials Co., Clayton Silica Co. Div. 313
Construction Machinery Co's 306
Corn Products Refining Co. 43
Crescent Brass & Pin Co. 279
Crobaugh, Frank L., Co., The 308
Crucible Manufacturers Association 11
Curtis Pneumatic Machinery Div. of Curtis Mfg. Co. 223

D

Davenport Machine & Foundry Co. 213
Dayton Pnuematic Tool Co. 312
DeBardeleben Coal Corp. 309
Delta Oil Products Co. 79
Demmler, Wm., & Bros. 44, 45
Denver Equipment Co. 82
Detroit Electric Furnace Div., Kuhlman Electric Co. 56, 57
Dings Magnetic Separator Co. 78
Dow Corning Corp. 46

E

Eastern Clay Products Dept., International Minerals & Chemical Corp. 255
Eastman Kodak Co., X-Ray Div. 193
Edmont Mfg. Co. 254
Electric Furnace Co., The 295
Electro Metallurgical Co., A Div. of Union Carbide & Carbon Corp. 76
Electro Refractories & Abrasives Corp. 199
Erie Steel Construction Co. 268

F

Fabreeka Products Co., Inc. 22
Factory Specialty Corp. 286
Fanner Mfg. Co., The 240
Federal Foundry Supply Co., The 2, 26, 27
Federated Metals Div., American Smelting & Refining Co. 91
Foundry Equipment Co., The 8, 9
Foundry Equipment & Supply Co. 284
Foundry Rubber, Inc. 202
Foundry Services, Inc. 294
Foundry Supplies Mfg. Co. 38
Foxboro Co., The 24
Freeman Supply Co., The 95
Fremont Flask Co., The 253
Frontier Bronze Corp. 301

G

General Electric Co. 39
Giffels & Vallet, Inc. 191
Goodyear Tire & Rubber Co., The 13
Gordon, Claud S., Co. 290
Great Lakes Carbon Corp. 159
Great Western Mfg. Co. 269

INDEX

H

Hammond Machinery Builders 299
Hauck Mfg. Co. 298, 304
Hercules Powder Co. 55
Herman Pneumatic Machine Co. 232, 233
Hickman, Williams & Co. 62, 277
Hines Flask Co., The 50, 51
Holcroft & Co. 266
Homer Mfg. Co., Inc., The 309
Hooker Electrochemical Co. 25
Hough, Frank G., Co., The 247

I

Illinois Clay Products Co. 143
Illinois Testing Laboratories, Inc. 274
Imperial Belting Co. 10
Induction Heating Corp. 94
Industrial Equipment Co. 48
International Minerals & Chemicals Corp., Eastern Clay Products Dept. 255
International Molding Machine Co. 242, 243
International Nickel Co., Inc., The 1
Iowa Mfg. Co. 52
Ironton Fire Brick Co., The 99

J

Jackson Iron & Steel Co., The 303
Jeffrey Mfg. Co., The 86
Jobbins, William F., Inc. 145
Johns-Manville 208
Johnson March 298
Johnston Mfg. Co. 281
Joy Mfg. Co. 181

K

Kawin, Charles C., Co. 288
Kaysing Iron Works 292
Keller Tool Co. 211
Keokuk Electro Metals Co. 83
Kirk & Blum Mfg. Co., The 90
Knight, Lester B., & Associates, Inc. 63
Korn, Wm., Inc. 302
Kuhlman Electric Co., Detroit Electric Furnace Div. 56, 57
Kux Machine Co. 54
Kwik-Mix Co. 270

L

Lanly Co., The 59
Lavin, R., & Sons, Inc. 97
Lindberg-Fisher, A Div. of Lindberg Engineering Co. 85
Lindberg Engineering Co., Lindberg-Fisher Div. 85
Linde Air Products Co., A Div. of Union Carbide & Carbon Corp. 58
Link-Belt Co. 77
Logan Co. 163
Logan Engineering Co. 298

Mc

McDougall-Butler Co., Inc. 309

M

Macklin Co. 84
Markal Co. 273
Marshall, L. H., Co. 204
Master Pneumatic Tool Co., Inc., The 305
Mathieson Chemical Corp. Inside Front Cover
Meehanite Metal Corp. 80
Metal Blast, Inc. 173
Metallizing Co. of America 313
Michigan Oven Co. 264
Milwaukee Chaplet & Mfg. Co. 291
Modern Equipment Co. 326
Molybdenum Corp. of America 249
Monk Tool Co., The 300
Monsanto Chemical Co., Plastics Div. 245
Moulders' Friend, The 187
Muller Machinery Co., Inc. 312
Murphy, Jas. A., & Co., Inc. 309

N

National Carbon Co. A Div. of Union Carbide & Carbon Corp. 139
National Engineering Co. 30, 31
National Forge & Ordnance Co. 307
National Lead Co., Baroid Sales Div. 263
National Metal Abrasive Co. 62
National Pigment Co., Inc. 176, 177
Neff & Fry Co. 306
New Haven Vibrator Co. 296
New York Belting & Packing Co. 237
Newaygo Engineering Co. 221
Nicholls, William H., Co., Inc. 61
Norton Co. 18, 72, 73, 203

O

Ohio Electric Mfg. Co., The 307
Oliver Machinery Co. 308
Orefraction, Inc. 53
Osborn Mfg. Co., The 174, 200, 201
Ottawa Silica Co. 272

P

Pangborn Corp. 6, 7, 229
Penn Iron Works, Inc. 301
Pennsylvania Glass Sand Corp., Pennsylvania Pulverizing Co. Subsidiary 23
Pennsylvania Pulverizing Co. Subsidiary of Pennsylvania Glass Sand Corp. 23
Penola Oil Co. 49
Petersen Oven Co., The, Stroman Furnace & Engineering Co. Div. 17
Pettibone Mulliken Corp., Beardsley & Piper Div. 165, 166, 167, 168
Philadelphia Coke Co. 312
Pickands Mather & Co. 89
Picker X-Ray Corp. 219
Pittsburgh Crushed Steel Co. 184
Pittsburgh Lectromelt Furnace Corp. 40
Pittsburgh Metals Purifying Co. 293
Plaster Process Casting Co. 295
Pressure Cast Products Corp. 98
Producers Core Sand Corp. 313
Puro-Seal Co., The 307

R

Radium Chemical Co., Inc. 297
Ready-Power Co., The 289
Reconstruction Finance Corp. 315
Reda Pump Co. 311
Reed Roller Bit Co., The, Cleco Div. 60
Redford Iron & Equipment Co. 183
Remmey, Richard C., Son Co. 271
Republic Coal & Coke Co. 311
Rietz Lumber Co. 276
Robeson Process Co. 314
Rockwell, W. S., Co. 264
Ross Operating Valve Co. 258
Royer Foundry & Machine Co. 137
Royersford Foundry & Machine Co. 302

S

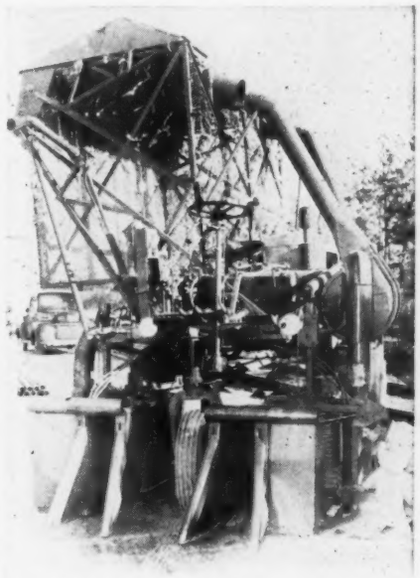
Scheu Products Co. 310
Schneible, Claude B., Co. 32

Continued on Page 324

Dear Reader:

. . . THOUGHTS FOR TODAY AND IDEAS FOR TOMORROW FROM THE FOUNDRY BUSINESS STAFF

$10 is ten dollars: We remember with satisfaction the time we were paid ten dollars for obeying an impulse. The editor of *Sales Management* offered that sum for acceptable letters on selling experiences. Knowing the pleasure we felt for this small experience, we urge you to note FOUNDRY's offer of a similar (or greater) sum. Turn to our Contents (page 3) and find this month's "How To Do It" department. Editor Frank Steinebach will be glad to hear from you.



What is it department: We are indebted to our friend, Ed Farmer, ad manager Bay State Abrasive Products Company for the accompanying photo of (to us) a completely new and novel mechanical wonder—the cotton picker. Special abrasive shapes were designed to roughen the steel teeth of this device for more efficient operation.

—o—

Ankara, Turkey: We recently learned of a new $1,000,000 pipe foundry (18,000 tons monthly output) under construction in Turkey. Our circulation records show two subscribers in this country. In due course, we may have three.

—o—

Riis Burwell: We appreciate the nice reception Massachusetts foundrymen have been giving to a new member of our circulation staff. We plan to add more personnel to the staff

Continued on page 324

Continued from page 323

and will welcome letters of application from persons interested in permanent employment calling on foundries for FOUNDRY.

—o—

Fairless Steel Works: Our sister publication *Steel* recently carried the first complete story of this fabulous new steel producing works. It is being built by 200 contractors, each with 10 subcontractors. Each subcontractor has one subcontractor, so there are 4000 companies involved. As someone has said, "After reading this article you could build a steel plant." Write to Jeanne Franklin of the FOUNDRY Business Staff for a copy of *Steel's* 24-page reprint of the article.

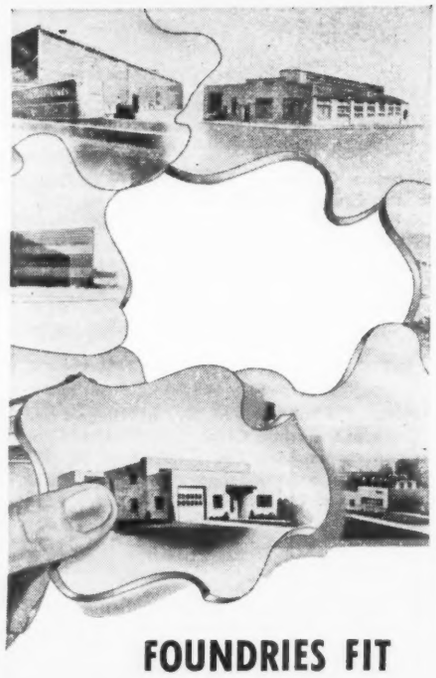
Congratulations! FOUNDRY advertiser Independent Pneumatic Tool Co., Aurora, Ill. is rightly proud of their employee-distributor-customer house organ, *Scoreboard*. Edited by Bob Budler, a recent issue was mailed to 100,000 readers. If you are a portable tool user, write to Bob and, no doubt, he'll be glad to put your name on their mailing list.

—o—

Ideas for Foundrymen: When you turn to page 259 and peruse the four page spread of literature descriptions presented again this month, will you consider giving us an opinion? We have requested editors Art Gregg, Henry Holtz, and George Sotak to write these descriptions with a light touch. Are we too whimsical or do you like our style as is? Just write your comments on one of the reply cards and tell us, won't you?

F. A. Rose

Business Manager



FOUNDRIES FIT INTO NO OTHER MARKET

THINGS ARE HAPPENING IN THE FOUNDRY INDUSTRY

Foundrymen speak a "language of their own" and those who sell successfully to foundries learned a long time ago to recognize them as an individual market—bound together by common practices and common problems found in no other industry.

An independent sales effort directed to foundries will pay dividends . . . this mass production industry is spending over *one million dollars every hour for materials and supplies—and two million dollars every week in capital investments.*

To meet the demand for castings, America's foundries last year topped every previous production record, including peak war years!

To make sure your story gets across to foundrymen, tell it in FOUNDRY. With its 45,000 readers, FOUNDRY gives you blanket coverage of the foundries that have 94% of the industry's melting capacity.

DO YOU HAVE THESE MARKETING AIDS?

- Marketing Guide, "How To Sell the Foundry Market." Available free.
- Data File, "Sizing up the Foundry Market." Available free.
- Penton's Foundry Directory. Cost $75.00.

NBP CCA **FOUNDRY**

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Cleveland 13, Ohio

Schrader's A. Son Div. of Scovill Mfg. Co. 195
Scientific Cast Products Corp., The 290
Scovill Mfg. Co., A. Schrader's Son Div. 195
Semet-Solvay Div., Allied Chemical & Dye Corp. 268
Shellcast Corp. 230
Simonds Abrasive Co. 12
Simplicity Engineering Co. 251
Sly, W. W., Mfg. Co., The 196
Smillie, C. M., & Co. 302
Smith, Eugene W. 186
Smith & Richardson Mfg. Co. 302
Smith Oil & Refining Co. 147
Smooth-On Mfg. Co. 305
SPO, Inc. 157
States Engineering Corp. 235
Stauffer Chemical Co. 194
Steel Shot & Grit Co. 184
Sterling Grinding Wheel, The, Div. of The Cleveland Quarries Co. 70, 71
Sterling Wheelbarrow Co. 100
Stevens, Frederic B., Inc. Inside Back Cover
Stroman Furnace & Engineering Co. Div. of The Petersen Oven Co. 17
Sutter Products Co. 66
Syntron Co. 272, 276

T

Tabor Mfg. Co., The 87
Tamms Industries, Inc. 288
Taylor, S. G., Chain Co. 303
Toledo Matchplate Co. 295
Towmotor Corp. 285

U

Union Carbide & Carbon Corp., Bakelite Co. 35
Union Carbide & Carbon Corp., Electro Metallurgical Co. 76
Union Carbide & Carbon Corp., Linde Air Products Co. 58
Union Carbide & Carbon Corp., National Carbon Co. 139
United Oil Mfg. Co. 67
United States Graphite Co., The, Div. of The Wickes Corp. 227
United States Rubber Co. 161, 271
U. S. Industrial Gloves 271
United States Steel Co., American Bridge Div. 308
United States Steel Co., Subsidiaries 308
Universal Engineering Co. 217

V

Vanadium Corporation of America 171

W

Wadsworth Equipment Co. 300
Walsh Refractories Corp. 81
Wellman Bronze & Aluminum Co., The 252
Wellman Engineering Co., The 308
Western Hardware & Specialty Mfg. Co. 310
Westover Engineers 267
Whiting Corp. 151
Wickes Corp., The, The United States Graphite Co., Div. 227
Wickland, A. A., & Co. 302
Willson Products, Inc. 287
Winter Engineering Co. 230
Woodward Iron Co. 141
World Bestos 212
Worthington Corp., Compressor Div. 28

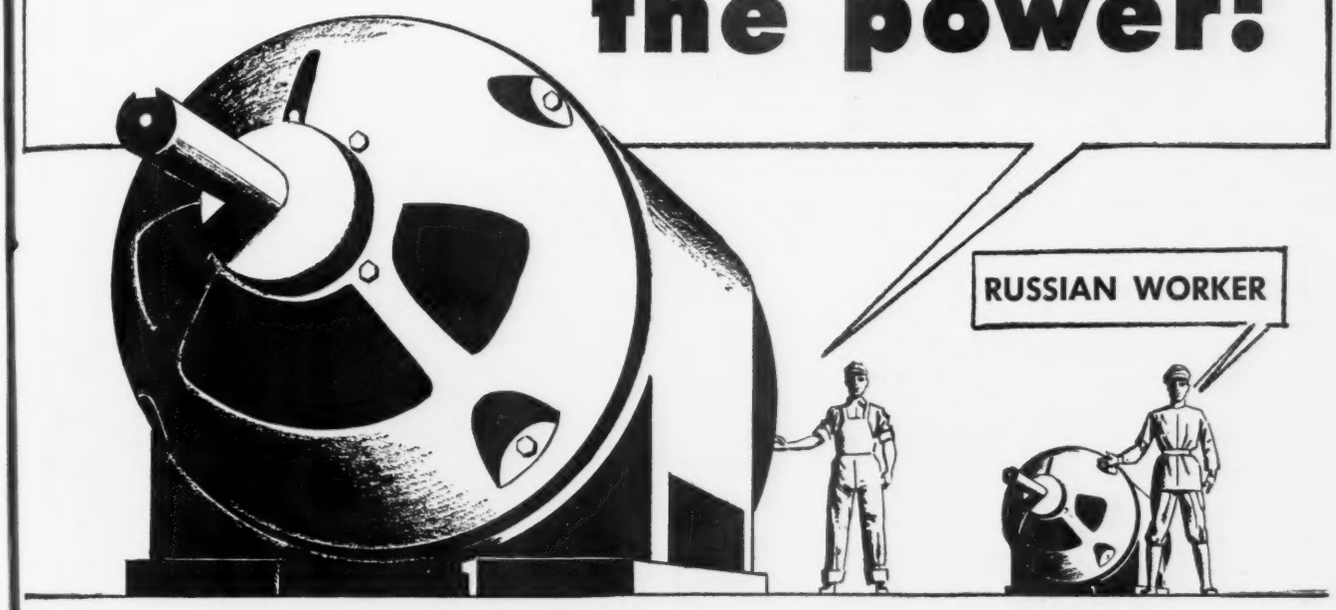
Y

Yuba Mfg. Co. 52

Table of Contents, Page 3

Classified Advertisers, 315, 316, 317, 318, 319, 320, 321

AMERICAN WORKERS HAVE 7 times the power!



How does America do it?

Why does the American worker have the help of about 7 times as many kilowatt-hours of electric power as is available to the Russian worker?

How can we Americans produce over 40% of the world's goods and bring so much more of everything to everybody with less than 6% of the world's population? Why is the American output per-man-hour still growing faster and faster?

The answers cannot be laughed off nor are they hard to find. In the words of Ralph J. Cordiner, president of the General Electric Company: "The greatest impetus for forward movement still comes when individuals are free to plan and carry out their own ideas without government coercion or unnecessary regulation."

Including estimated expenditures in 1952, private industry in the last seven years will have invested over 150 billion dollars in new plant and equipment. This contrasts with Federal Government investment of not much more than 12 billion for similar purposes in the same period. Moreover most such Government expenses during the last three years have been allocated to military and atomic projects.

Back of all this progress in private industry is the unique American system of competition—our kind of competition that continually stimulates Americans to make things better and to sell them better—and at lower prices.

In America we do not just compete for public office; we also compete in technology, competency of management, individual initiative and distribution—the latter including selling and advertising in all their varied forms.

Our kind of competition promotes the growth of more and more businesses and industries—and this means more jobs and expanding prosperity from which we all benefit.

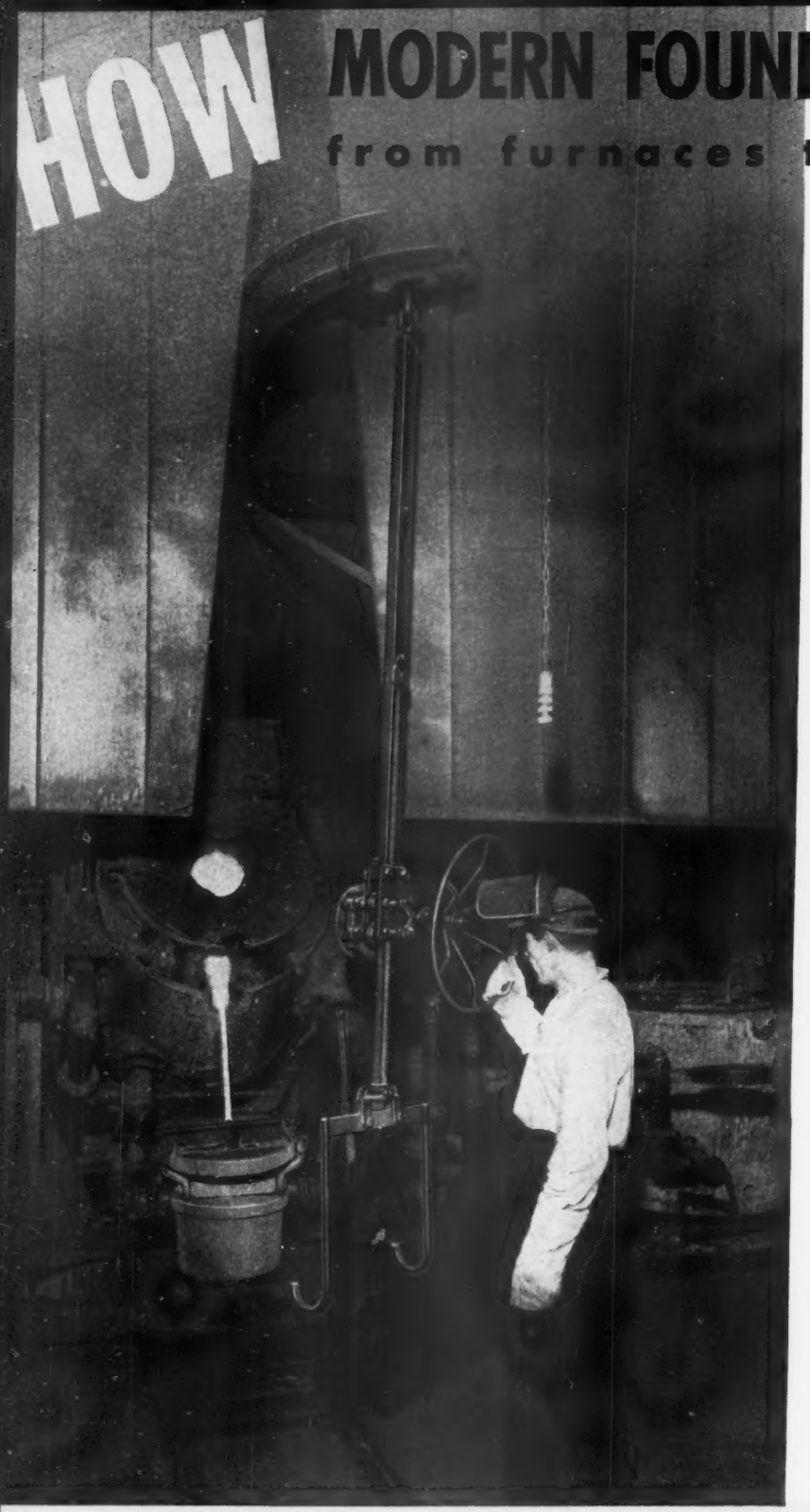
"Planned economies" and other fancy theories are not for us. The American competitive system has given us the highest standard of living in the world. Let's all work to preserve it.

This report on PROGRESS-FOR-PEOPLE is published by this magazine in cooperation with National Business Publications, Inc., as a public service. This material, including illustrations, may be used, with or without credit, in plant city advertisements, employee publications, house organs, speeches, or in any other manner.

THE COMPETITIVE SYSTEM DELIVERS THE MOST TO THE GREATEST NUMBER OF PEOPLE

HOW MODERN FOUNDRY METHODS PAY

from furnaces to finished parts...



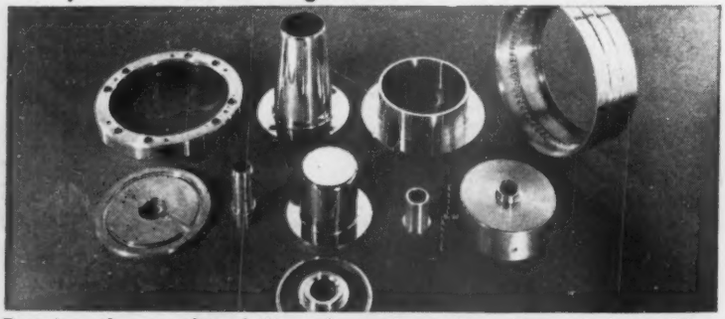
here in one of America's, prominent, non-ferrous foundries every known, modern method is put to work for safety's sake. It's a pre-planned operation that safeguards the high quality of Ampco* (aluminum bronze).

MODERN Pouring Devices with their quick-detachable bails swing into action to handle, alternately, ladles and crucibles with their heavy loads of precious metal. More perishable than fresh milk the metal flows, at highly uniform temperatures and without interruption, from covered, MODERN ladles. And right along with this maximum safety protection, for men and metal, there follows an ease of operation that insures the day-after-day high yield from furnaces to loading docks.

Ampco's* turning of finished castings into finished parts is an interesting operation — as modern as it's melting and pouring methods... as practical as tomorrow's foundry planning.

Through a closely WORKING TOGETHER with successful foundrymen, here and everywhere for more than thirty years, MODERN engineers have pioneered and are continuously expanding new uses for MODERN Pouring Devices. Today there's a Device and a method for every pouring-floor-need. SO, whether you put up a couple floors a day or pour a hundred tons of metal in a round-the-clock operation it will pay you well to get the entire story. Literature and films are available to foundrymen. Returning the coupon will start things moving in your direction . . . .

Model FA Pouring Devices are quickly attached to ladle trunnions and crucible shanks with top safety for pour-off men.
*** Ampco — trademark registered**



Proving the machinability of good castings in varied machine shop practice is a plus service to Ampco* customers. Parts shown here are examples of precision work produced.

MODERN

MODERN EQUIPMENT COMPANY
Port Washington, Wisconsin

MODERN EQUIPMENT COMPANY
Dept. F-11, Port Washington, Wisconsin

Without cost or obligation mail:

Catalog on metal pouring systems	147	☐
Cupolas and cupola chargers	147A	☐
Cranes and monorail systems	150	☐
More information on FREE use of MODERN films		☐

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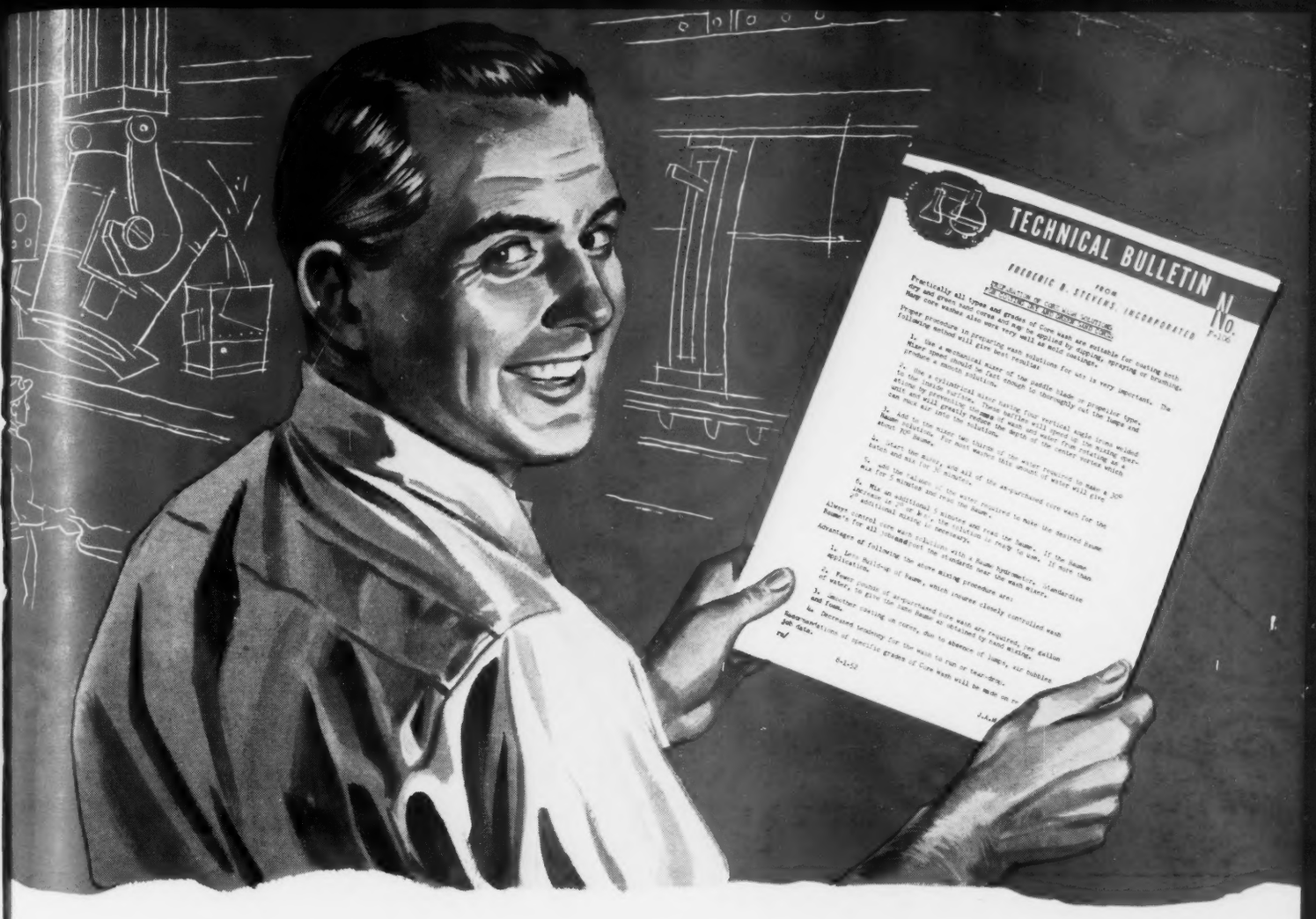
City ..... State .....

Individual .....



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F-101 Stevens Sand Conditioner
F-102 Stevens No. 143 Core and Mold Surfacer
F-103 Seacoal in Sand
F-104 Stevens No. 10-T Chill Wash
F-105 Stevens Fastick Liquid Core Paste
F-106 The Preparation of Core Wash Solutions for Coating Dry and Green Sand Cores
F-107 The Use of Plumbago
F-108 The Use of Wash on Skin-Dried and Dry Sand Molds
F-109 Solvent Products and Their Use
F-110 Slick Seal and White Mudding Compound
F-111 Liquid Partings and Their Use
F-112 Dry Partings and Their Use

Additions to these bulletins are constantly being made by the Stevens Customer Research Laboratory. Ask for this informative series today. See your nearby Stevens representative, or write direct. *Frederic B. Stevens, Inc., Detroit 16, Michigan.* Of course, there's no obligation.

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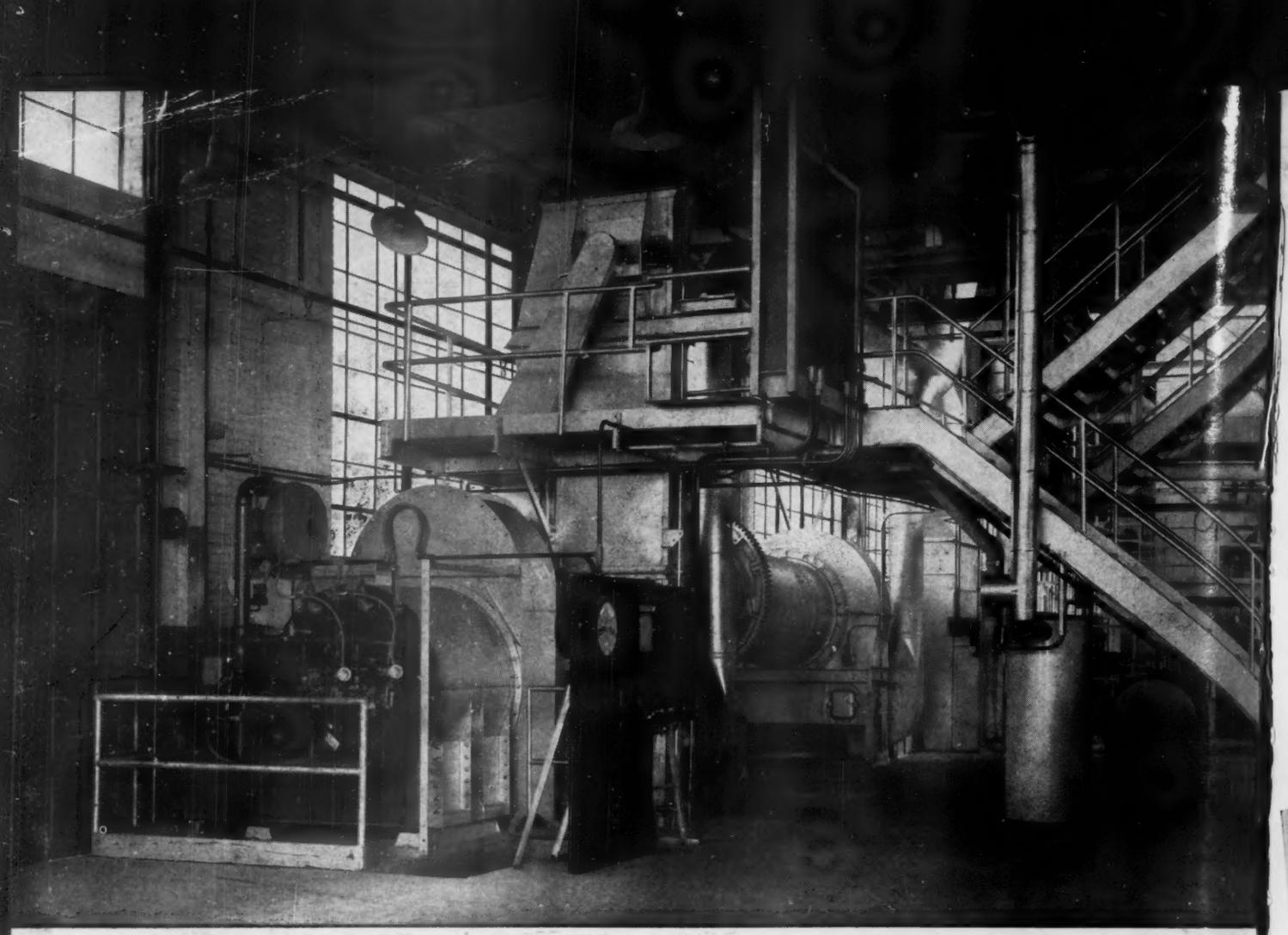
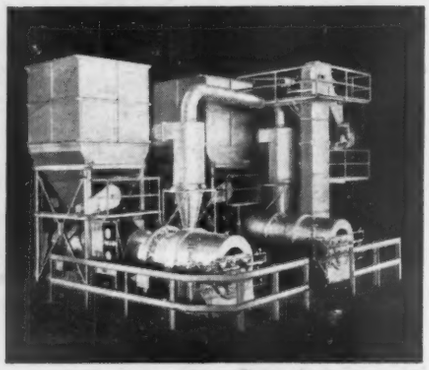
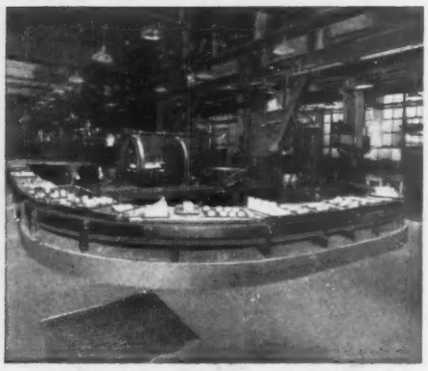




Complete Sand Drying and Handling Equipment Showing Discharge of Dried Sand to Core Room.



View in Core Room Showing Continuous Car Type Conveyor That Carries Cores to Ovens.

Sand Control

cuts core costs

● Drying your own core sand results in better deliveries and lower sand costs. It permits exact duplication of every mix — saves on binders — results in a uniform bake — constant core structure and reduces losses of both cores and castings.

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